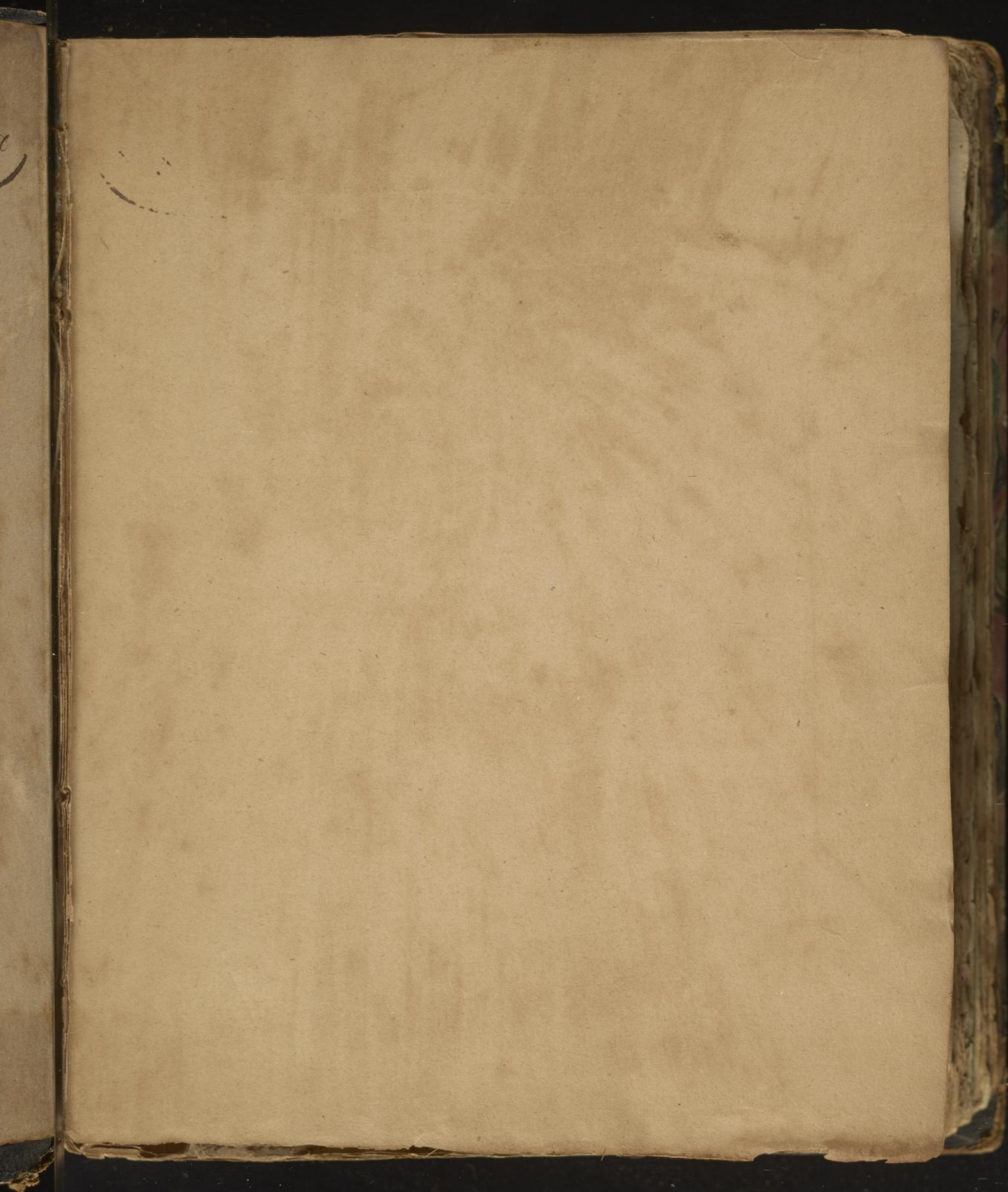
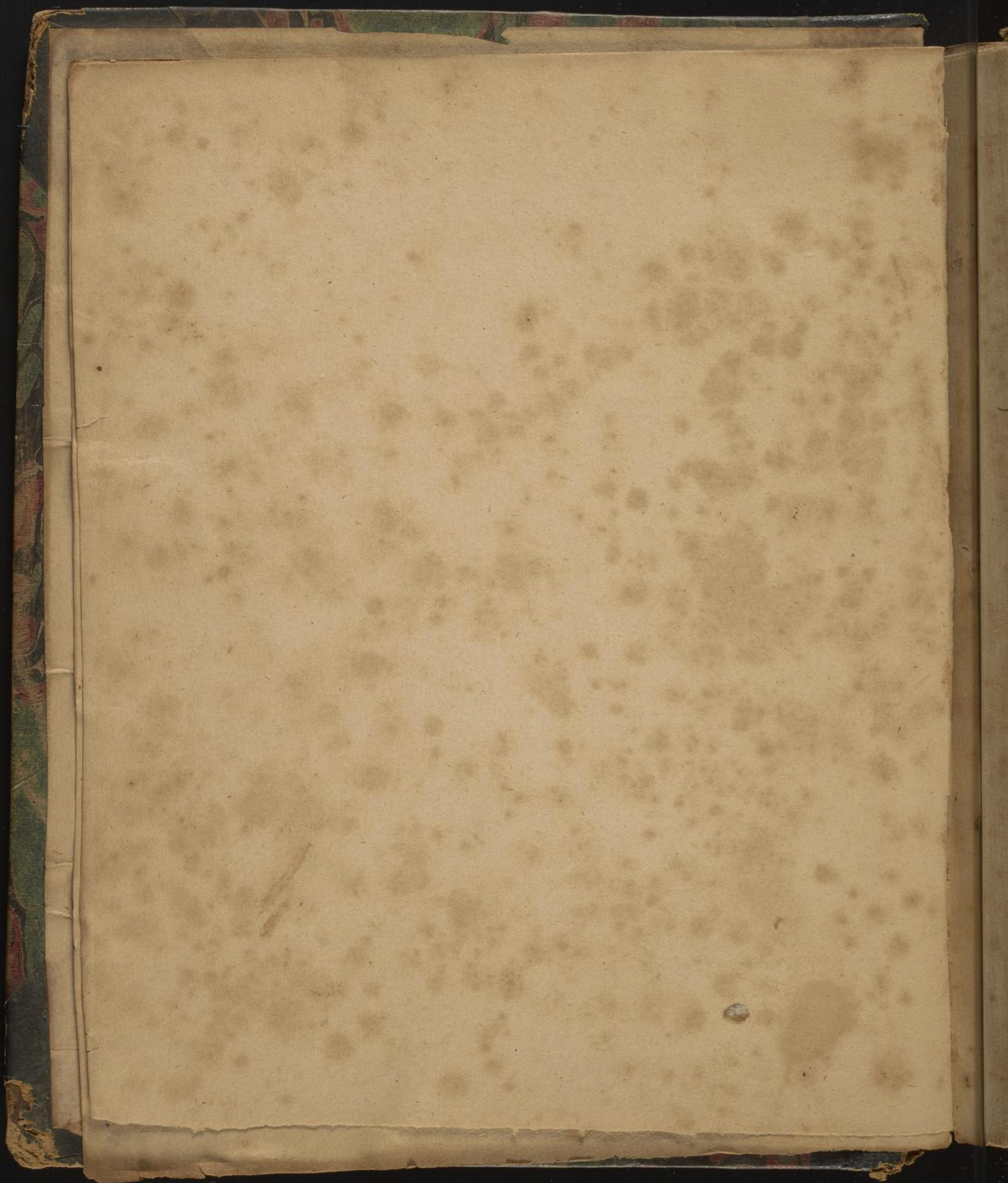


2.

J. Chambers^{sr}
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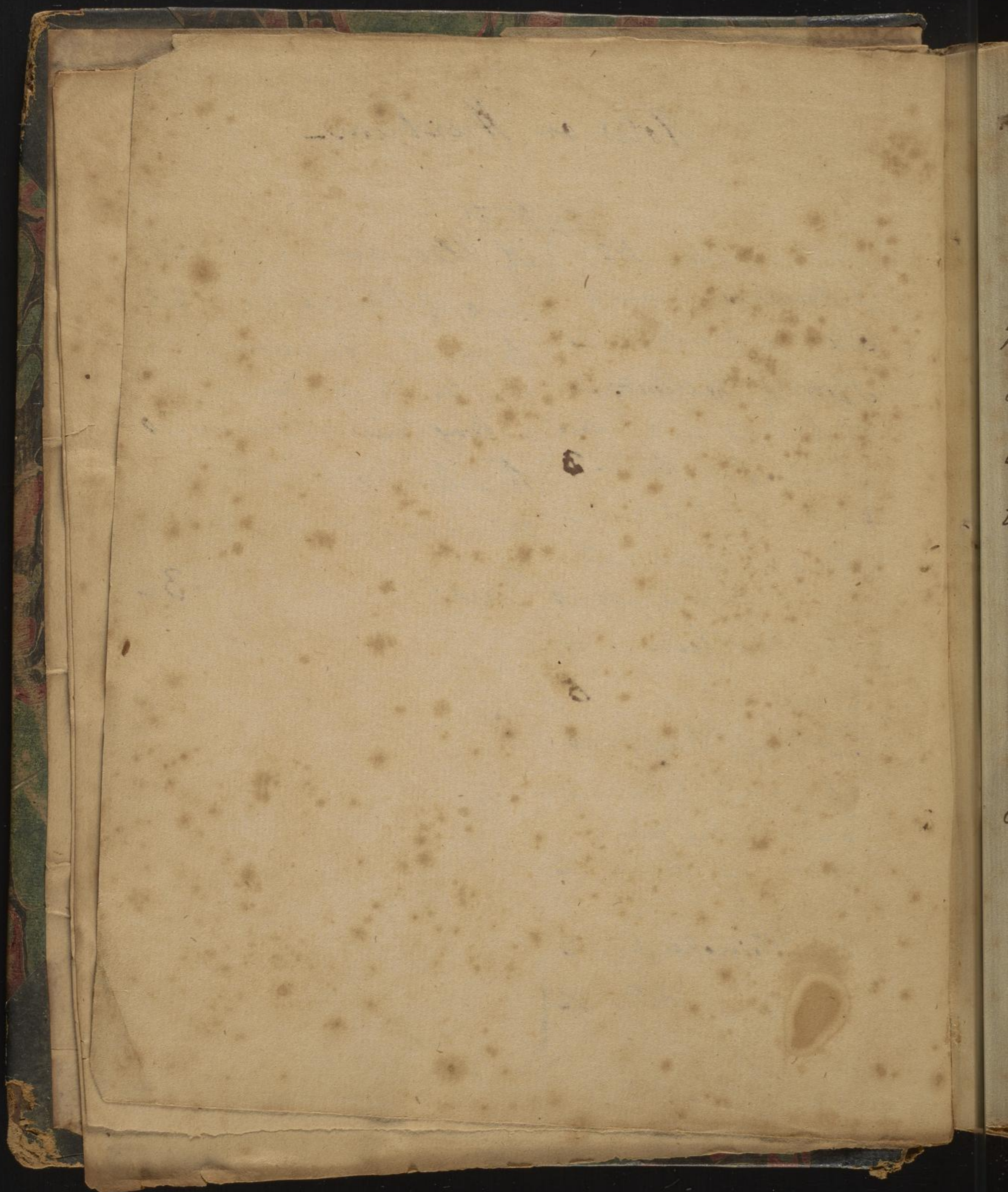




Notes on Aukhams

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(1)

Notes On Huxham

He cautions the young practitioner
against being deceived by the oppressed
pulse in ~~the~~ fever is often the consequence
of too great a fulness of blood. If he is
doubtful in the case let him apply his finger
to the pulse in the other arm, while the Patient
is bleeding, and if he find it flag
considerably, flutter, or intermit, it
is time to desist: if it beats stronger and
more open he may proceed with safety
and success. —

He opposes the Practice of Bleeding in
the beginning of all Ardent and Inflam?
fevers. And recommends Clysters or Gentle
Purges such only as act on the intestines

2
3

Canal, as Manna, Glauber's Salt &c. -
little more seems necessary in the cure
of acute fevers, than proper and well
timed Evacuations, and plentiful cooling
dilution, with a few restorative Medicines.
Diluting Drinks to be taken but not too
much at a time - tepid Baths - -

Of Intermittent fevers.

Proximate Cause of Ague is a moist
foggy Atmosphere exhaling from a
swampy, morass soil, -

He mentions the influenza's prevailing
in the Spring of 1743 and that it frequently
became pleuritic, or pleipneumonic and
as frequently after 2 or 3 Days turn into -
Quotidian or tertian, is he ascribes to the
difference of the constitutions of Patients. -

Quotidian and double tertians/ & by the bye
are often the same thing/ will not bear the
Bark in the beginning; till the febrile Draught
of purging and vomiting have been
made use of.

Quotidian Catarrhus comes nearest
an inflammatory State. - and if the
fever from a tertian, turns into a semi-
=tertian, or Quotidian, or greatly anticipates
the Time of the Regular Paroxysm - & be-
=comes intermitting, or Continual fever is forthwith
the Consequence. And this is too often
effected by a very hot Regimen, or a
too hasty use of the Bark.

In truth I never give the Bark pre-
=sently in Venereal Agues, till after 4 or 5

Paroxysms at least, and after having
drawn more or less Blood from Persons
much inclined to the sthenic. —

Nothing is more effectual in curing Agues
than well timed Vomits. — (as Nature shows
us, by making this one of her constant
Efforts in the Paroxysm) so previous bleeding
makes them much more safe, in full
Sanguine Habits, especially when given
in the Paroxysm, is frequently prac-
tised with great Success. — He sometimes
gave Nitre with the Bark. — ~~and~~ But
Agues in affect Persons of a lax Habit and
from them Blood requires a warm, in-
=vigorating alternaing Regimen. As Cortex
Peruv: frequently proves ineffectual
unless assisted with proper Alesopharms
As R. Scrp. & Virg. — Contrayev. Myrrh. Camphor &c.

(2)
If an Intermitting runs into an inflammatory
Continual Fever, Bleeding and a gentle Cool
Purge will soon reduce it to its Type.

Never be too hastily in giving Bark or
Chalybeates when the Patient has a yellow
Cast of the Countenance a tense Abdomen
and a very costive habit of Body. -

In case Mucous, sapronaceous,
Decubitus is Rhus, Aloetics, Regenerates
or Soluble Tartar - must be premixed
or joined with the Bark. -

He ^{concludes} ~~concludes~~ from previous Reasoning
that a Typhoid Tertian is a medium
between an Inflammation and
slow nervous Fever

~~on every kind of fever~~ and that on the
one hand, the Constitution of the Solids and

fluids may be highly wrought up as to
fire the Blood into a continual inflammation
and that on the other, it may be so far
depressed as to bring on the low Influenza
or slow nervous fever. Hence the cause
and cure of such Fevers seem to be
obvious. -

He states that every kind of fever is a
struggle of Nature to relieve herself from
something Oppressive, we should always
favour her Endeavors by the most
proper means that Reason and
Experience can suggest. - but we
should be very cautious in the beginning
Especially, how we proceed in suppressing
or in bridling her efforts, till we have
well considered the Nature, Quantity

and Quality of the Disease and the Con-
-stitution of the Patient. - In order to this
it will be highly necessary to make
a diligent Examination into 2 Things
1 The State of the Solids,
2^{dly} That of the Fluids -

Of the State of the Solids.

The Cold Bath (he considers of infinite
advantage to Persons of lax Fibres and
weak. but not so much to to Persons
of a close fibre - Indeed (he says) in
the times of Popery and Ignorance
when the Priests were knaves, and the
People Fools, Many a Well was foun-
-dified for nothing but pure Cold Water

He concludes that the fibrous system in
Persons of a dense Habit may become
overbraced by the Cold Bath. by it
means too much of the finer Lymph
and even of the Liquidum Nervosum
^{maybe} forced off by the Pores. -

In the Eruption fever of Small Pox he thinks
it would be unpardonable not to bleed
before the Eruption in Persons of a strong
athletic Habit - and says it would be
great Taskmsh to bleed a person of a
weak Habit - He is governed very much
by the Constitution of his Patient in the
treatment of this ^{or any other} Disorder. Thus he says.

Hard firm flesh, dry Skin, Great Heat,
Thirst, and Colour, hot Breath and violent
pains, with a strong, tense, quick Pulse,

are putty, cordant Symptoms of Strang.
 very elastic Fibres, and of an ardent
 and inflammatory fever.

A weak, quick, soft pulse, no great
 Heat, or Colour, little thirst, pale
 Urine, a soft Flesh and Skin, clammy
 partial, irregular, cold or profuse
 Sweat, with Heaviness and Anxiety,
 rather than from Jaundice, and a moist
 tho perhaps a white coated, or fawn
 Tongue denote the Contrary.

Of the State of the Pleids.

Heat in an ardent Fever will turn the
 Blood into a Jelly as is formed by exposure
 Hence when Blood is drawn off in high
 inflammatory Fevers, it appears covered over

with a thick glutinous coat, or Buff as
it is called. - I have seen it he says
in some severe pleuritic and Rheumatic
Disorders near an Inch thick. -

That it is formed by the febrile Heat is
Manifest; for at the first Bleeding at
the very Beginning of the fever, it shall
often appear pretty fluid, tho' very dense
whereas on the second, third, or fourth
Bleeding when the Heat hath had a
longer Continuance and been increased
to a greater degree it becomes exceedingly
Silly -

* Acid and inflammatory Fevers are naturally
the Effect of over elastic and rigid Fibres, and
a very dense and viscid blood; as the low
and slow nervous kind are of a too lax
State of Vessels, and a weak and thin Blood.

Of the Dissolved and putrid
State of the Blood.

^{cc} When Women have large irregular Spots like
Bruises they are always subject to a vast
Overflow of the Catamenia,

Blood drawn in such Cases. Tanais is
an uniform half coagulated Mass a mere
Gore as it were, not separating into Cream
and Serum generally of a livid or darker
Colour than usual, tho sometimes it continues
long very fluid. — In these Cases Drawing
of small Quantities of Blood is proper, to
abate the too great Impetus on the tender Vessels
even tho there may be no apparent Plethora. —

For a thin alcaliscent State of the Fluids
and bleeding of the Gums, Spongins &c
he recommends Bark and Elixir of
Vitrid.

The Use of Alkaline Medicines as Sp. C. C.
have a tendency to produce this State
of the Blood - The Alkaline Medicines
that have usually been made use of
for the Stone - produce the thin dissolved
State of the Blood. - as Vol. Alk. will
keep the Blood from coagulating out of
the Body. - The Bite of a Viper and other
Venomous Animals bring on a very sudden
Corruption and Dissolution of the Blood. -

"It is always a fatal Prognostic, when Spots
and Hemorrhages appear at the very eruption
of the small pox and the sick seldom or
never survive the 9th Day. of the Disease;
the Blood running into Dissolution &c.
I am persuaded scarce one in a thousand
recovers under these dreadful circumstances.
Especially if the Spots are very livid, black
and numerous. - The only Remedy is Bark
and Acids which certainly often have very good Effects

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infectious fevers attended with Hemorrhages.

Dr. Reid recommended them strongly in the putrid and Bleeding form of Pox and also the Method of using them.

In Pluritic Affections of the Colon of the Buff instead of being of a whitish yellow as usual the Color resembles a Cornelian Stone or a little more dense than that of the Common Jelly of red currants - This Color of the Buff on blood I constantly observe to be an ill omen. - as also when the blood is of a dark livid color covered with a lead Coloured or greenish thin film. -

He mentions a Malignant Pulmonic Fever in which Bleeding appeared to sink the Patient immediately. - even when attended with hard full great load at the Breast. - pungent pain of the Side and severity of the Cough had warranted him in advising it. -

He mentions a Case of a Surgeon who was
sick with fainting from Debility in which
liver spots had appeared on several parts
of Body with Hemorrhages from Gums
&c - Having been cured by Banks
an 2. etc having previously been
twice bled.

Of the Difference between a slow
Nervous, and a putrid Malignant fever. -

Huxham supposes that in putrid malignant
fevers the Blood peculiarly so called is
affected. Whereas the slow nervous fevers
seem to have their seat chiefly in the Lymphatic
and nervous Juices. -

Of the Slow Nervous Fever.

The patient at first grows somewhat restless
and feels slight Chills and shudders, with
uncertain sudden flushes of Heat and a kind
of weariness all over, like what is felt after great Fatigue.

This is always attended with a sort of heaviness
and distension of Spirit and more or less of
a load or Pain or Giddiness in the Head
a Nausea and disrelish of every thing
soon follows, without any considerable
thrust, but frequently with urging to vomit.
The little but viscid Phlegm is brought up.

This a kind of lucid Interval of several
Hours sometimes intervenes, yet the symptoms
return with aggravation, especially towards
night: The Head grows more heavy, or
giddy, the Beats greater, the Pulse quicker
but weak, with an oppressive kind of
breathing - a great Torpor, or obtuse
Pain and coldness affects the hind part
of the Head frequently - and oftentimes a
heavy pain is felt on the Top all along
the Coronary Suture - This, and that of

the back part of the Head, generally attend
nervous Fevers, and are commonly succeeded
by some degree of a Delirium. — In this
Condition the Patient often continues for five
or six Days, with a heavy pale sunk
Countenance, seeming not very sick and
yet far from being well. Restless, anxious
and commonly quite void of sleep, tho
sometimes very drowsy and heavy — but
altho he appears to those about him
actually to sleep he is utterly insensible
of it and denies that he doth so.

The Pulse, during all this time, is quick weak
and unequal, sometimes fluttering, and
sometimes for a few moments slow, very
intermitting; and then with a sudden
flush in the Face, immediately very quick,
and perhaps soon after suspiciously calm and
equal; and thus alternately. —

The Heat and Chills are as uncertain and unequal, sometimes a sudden colour and Glow in the cheeks, while the Tip of the Nose and Ears is Cold, and the forehead at the same time in a cold dewy sweat. Nay it is very common, that a high colour and Heat appear in the Face. when the Extremities are quite Cold. The Urine is commonly pale, and often limpid, frequently of a Whey colour, or like Vapid small Beer, in which there is either no manner of Sediment, or a kind of loose matter, like Bran, irregularly scattered up and down upon it. The Tongue at the Beginning is seldom or never dry or discolored, but sometimes covered with a thin whitish Mucus. at length ~~these~~ it often appears very dry, red,

and Chapped or of the color of the pomegranate
ate Rind. but this mostly at the start
or close of the Disease. - Yet however
dry the Tongue and Lips seem, the
Patient scarce ever complains of thirst
tho sometimes of a Heat in the Tongue.
About the 7th or 8th day the Headaches,
Pain, or Heaviness of the Head, become
much greater, with a constant Noise
in it, or Tinnitus Aurium, which
is very disturbing to the Sick. - and
frequently runs on a Delirium.
The Load on the Praecordia, anxiety
and ~~Tumors~~ grow more and more
urgent, and they often fall into an
actual Delirium especially if they
attempt to sit up. Coldish sweats suddenly
come on in the forehead, and on the back of the hands.

(The at the same time there is too much heat in
the Cheeks and the Palms) and as suddenly
go off. If the urine now grows more pale
and limpid, a Delirium is certainly to be
expected with universal Tremors and
Subsultus Tendinum. The Delirium
is seldom violent, but as it were a
Confusion of Thought and action, muttering
continually to themselves, and faltering
in their Speech: Sometimes they awake only
in a Hurry and Confusion, and presently
recollect themselves, but forthwith fall
into a Muzzling, dozy State again. —

The Tongue grows often very dry especially
in the middle part, with a yellowish
tint on each Side, and it trembles greatly
when the Sick attempt to put it out. —
When the Tongue at this time grows more moist
and a Copious Spitting comes on it is always a good Sign.

But when a difficulty of Swallowing,
Continual Gulpings, or Choking in
the Throat supervene, it is a very
dangerous Symptom especially if
attended with any degree of Angustia
Frequently profuse sweats pour forth
all at once about the 9.th 10.th or 12.th Day.
Commonly coldish and clammy on
the Extremities. Oftentimes very thin
Stools are discharged; both the one and
the other are generally Colligative
and very weakening. - However
a warm Moisture of the Skin is generally
salutary and a gentle diarrhea frequently
carries off the Delirium and Comatose Dis-
position. Now Nature sinks apace, the
Extremities grow cold, the Nails pale or livid
the Pulse may be said to tremble and flutter

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rather than ^{to} beat, the Vibrations being ex-
ceeding weak and quick, that they can
scarcely be distinguished; tho sometimes they
creep on surprisingly slow and very
frequently ~~intermit~~. The Sick become
quite insensible and stupid, scared affec-
ted with the loudest Noises or the strongest
Light; tho at the Beginning strangely susceptible
of the impressions of either. — The Delirium
now ends in a profound Coma and
that soon in eternal Sleep. The Tears,
Stools, Urine &c run off involuntarily
and denounce a speedy dissolution
Trembling and Twitching of Nerves are
a prelude to general Convulsion — All Persons
grow deaf and stupid toward the End of
the Disease. An Imposthume of the Ear is
favorable or wth a Parotis suppurates or a

Large pustular angry Eruption breaks
out about the Lips and Nose. —

Cure

Bleeding and Drastic Purges very improper
in it — Puke (a gentle one at the beginning
to cleanse the prime Viscæ — Any thing
drastic he denounces in the strongest terms
Vomits he thinks much less injurious and
even proper at times — Particulars at the
first Attack — Clysters of Milk, Sugar
and Salt may be injected with safety
and advantage every 2^d or 3^d Day if
necessary. — Temperate, Corrosial, diaphoretic
Medicines are most proper in these fevers;
and a well regulated, supporting, dietary
Diet is necessary — The latter if judiciously
used will go a great way towards a cure

especially if assisted by well timed and
well applied Blisters and keeping
the Patient quiet in Body and Mind
But it should be noted that any strong
Operative are very pernicious, however
want of Sleep or great Tortures
may demand them - Small
Quantities of Paregoric: Elixir - or Pulv.
Contra-yer. Comp. with a little Castor and
Saffron and for all quantities of
Theriac: Andromachi have much
better effects. Which by causing a gentle
sweat calm the hurry and tumult
of the Blood, and soft refreshing Sleep
succeeds - when the Confusion and Dejection
of Spirits are very Considerable, Galbanum
or Sylphium with a little Camphire, should
be added - And Blisters should forthwith be

applied to the Neck, Occiputs or behind the Ears:
and during all this a free use of thin wine
- whey some pleasant Steam or Gourel,
with a little soft wine, must be indulged.

Chicken Broth - Thin Jellies of Harts. Horn
Lays Parado, are useful, adding an
little Wine to them, and the Juice of
Seville Orange or Lemon. -

Profuse Sweats should never be encouraged
much less attempted by strong heating Medicine
Such as Vol. Alk. Sp. C.C. &c. particularly
in the beginning, or advance of the Fever.

For they too much exhaust the Liquidum
Vitale and are followed by a vast Excretion
of Spirits, Humors, irregular, partial
Heats &c, a vast Load and Oppression on the
Precordia so as to incline the less cautious

Observe to think there may be something
peripneumonic in it. but even here
beware of Bleeding for the Pulse will
be very small and unequal tho very
quick. The Breathing in this Case, tho
thick and laborious, is not hot, but a
kind of Sighing, or sobbing Respiration.
And the Oppression on the Praecordia arises
from nervous Organs, not from a peri-
-pneumonic Obstruction. and this is very
manifest in hysteric Paroxysms

I commonly use the following Bolus
and Saline Draught.

R. Pulv: Contrayerv. C. \mathfrak{q}^{ss} xv. ^{ss} Croc.
Anglic. \mathfrak{q}^{ss} iii. Confect: Raleigh. \mathfrak{H} Syr.
Croc. \mathfrak{q}^{ss} i. M. f. bol.

& when vast tumors and Subcultur Indurum come on I use
Musk \mathfrak{H} instead of the Pulv: Contrayerv. C. with great success.

in the menstrual system.

R. Sal. b. l. ℞. Succ. Limon Ziir.
Ag: Alexet. simpl. Zip. m. peracta
effervescentia Adde Sp. Lav. Comp.
Lyr. Coc, ana Zip. M. & Haust.

These or the like, I order every 5th 6th or
8th Hour, and a temperate Cordial Julep
Sp. Vol. Anisat. or fœtidus may now
and then be given out of thin Wine, or
Cider - Whey. or which is in many
Cases better, out of thin Mustard wey;
which without any more pompous
apparatus is not a contemptible Medicine
especially for the Poor.

a miliary Eruption frequently takes place
where profuse Sweating accompanies -
little Red Wine is serviceable -

Towards the Decline of the Fever, when
the Sweats are abundant and weakening
I moreover give small Doses of the Tincture
of the Bark with Saffron and Snake-Root.
interposing now and then a Dose of Rhubarb
to carry off the putrid collections in the
first passages. He generally gave the Bark
at this ~~last~~ Period out of the Saline Draughts
which makes them more effectual. —

I have known Patients / He says / sink under
this Fever after having been kept in a
Sweating Method for 5 or 6 Weeks together. —
and after having gone thro 3 or 4 Crops
of Miliary Eruptions. They all the while
melting away and welling in their own sweat
and the Bed wetting under them.

A gentle diarrhoea is sometimes of service

but those, Colliquative stools are very far from
being so. particularly when livid or of a
lead color. Salivation always favorable
however weak and stupid his Patient was
he never despaired when this was the Case.
Nothing completely Critical in this Fever. -
Fever often partly runs off by intestines
and urinary passages. - Now, tho' these
Discharges are many times profuse they
are not to be too hastily suppressed,
without causing a very dangerous
Translation of the morbid matter
on the vital parts. Sweats must
be carefully checked and Blisters
ruled up with care. the more they
discharge the better. so that when the first
Blisters heal up others should be applied

to other parts - for it is not merely from
the Stimulus, but also from the Drains that
they make, that they are discernible. -

The large angry pustules, that often break
forth at or after the State of this fever
and frequently ulcerate and run largely
are a kind of natural Blsters, which
give vent to the putrid corrosive Ichor
and sufficiently indicate one way
of giving ^{nature} Relief. -

He considers profuse sweats in small Pox or
Measles very detrimental.

Of Putrid, Malignant, Petechial
Fever. -

He observes, that the putrid and
malignant Fevers at the very onset, greatly
sink the Spirits and cause great weakness
Especially when from contagion.

yet Bleeding to some degree is most
Commonly requisite, may necessary in
the strong and plethoric, and should
be done as early as possible. - a quick
tense pulse, sharp Heat, great Difficulty
of Breathing, Palpitation of the Heart and
Violent Pain in the Head and Back evidently
demand it. - In malignant fevers the
Blood drawn is of a much looser texture
and softer consistence, than that of Pleuritis.
He considers gentle Vomits useful but does

not approve of drinking too copiously of
warm Water during the Operation of an Emetic
he considers it Oppressive to the Stomach.

Gentle Purgers - Manna - Glycer. Salt
Glycer. &c. — He cautions strongly
against drastic Purgers - Hoffman
cautions even against Senna. —

He generally gave a gentle Laxative the
8th or 9th Day unless I find some Eruption
appearing, or a kindly Sweat forbid it.

Until this time, I seldom use any kind of
Purgative except a little Manna. Or
Pantar &c. Ordering an Emmellent Laxative
Glycer every second or third Day. — This
gentle method of Purgine for many Years
he found of great Advantage but protests
against Aloetic, Scammoniate & Colocynthis Purgers.

It is always dangerous to suppress a critical
Diarrhea prematurely. — and should never
be done without permitting a small
dose or two of Rhubarb. ^{Tho} he often
found a Diarrhea salutary at the decline
of these Fevers. he generally found it
prejudicial at the beginning. Nothing
more certainly shews a Diarrhea to be
useful, than when a gentle breathing
Sweat or warm moisture of the skin,
accompanies it. — Tho ~~for~~ warm
breathing Sweats are the more certain
means of carrying off the fever yet
they are not to be driven out too soon
by hot medicines. — As Val. alkali &c.
He opposes Blisters - till fever is somewhat
subdued - as they are apt to produce Stenury
and other Effects ~~some~~ of a pernicious tendency,
as Perigilium, Delirium, Tremors, &c

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He therefore advises the young Practitioner
before they deal largely in these wholesome
Severities to Consult Baglivi de usu et
abuso Vesicantium. And he advises when
Several Blisters are laid on in any acute Case
The Patient should drink freely of whey,
Emulsion &c. - otherwise he may suffer
almost as much from the Remedy as
from the Disease. Camphire he considers
an excellent corrector in such Cases.
And more especially it answers a more
important purpose in putrid pestilential
Fever by promoting a Diaphoresis or
easy Sweat. and by no means heats
as much as Vol. alk &c. Camphire joined
with an Opiate he says is the most certain
Sudorific in Nature. But Opiates should never
be given but in small Quantities. as Elis. Parez &c.

Camphire however has the fault of
being very disagreeable to the stomach
sometimes but when dissolved or rather
intimately mixed with hot Vinegar
after the manner of the Julep. & Camphore
it gets much easier, and is a medicine
excellently well adapted to putrid malignant
fevers. for both Camphire & Vinegar are
highly recommended in pestilential Fevers.
Reinarius had a Statue erected to his Memory
for the Service he did in the Plague at
Verona by a Medicine, the Basis of it
was Camphire.

The following is the formula of the
Bark which he commonly used in all fevers.

R. P. Cort. P. Zi^{ss} Flav. Amant. Hispal Zi^{ss}. Rad. Sup.
Virg. Zi^{ss}. Croc. Angelic Div. Cocculi Zi^{ss}

Lp. Vin. Gallic Zi^{ss}. f. Infusio Clausa per aliquot
Dies (tres saltem quatuor) deinde Colatur.

Of this I give from ʒi to ʒss every 4th 6th
or 8th Hour with 10, 15 or 20 drops of
Elixir Vitrioli out of any appropriate
Draught, or diluted Wine.

He recommends a little Red Wine occasionally
particularly in the decline of the fever acid=
=ulated with Juice of Seville Orange,
or Lemon. It may also be impregnated
with some aromatics, as cinnamon &c.
And a few drops of Elixir Vitriol.
A little generous Cider is not much
inferior to Wine.

An Essay on the Small Pox.

He recommends Copious Bleeding when the pulse indicates & vice versa. during the Eruptive fever of Small Pox. —

Bleeding instead of retarding promotes Eruption by calming irregular Action —

In weak, Pulse, general Languor, Nausea Dizziness of the Head &c. avoid V. S. —

Bleeding in the Foot is known to make a Revolution for the Head — He advises Bathing the feet in warm Water before the Eruption 2 or 3 times a day. The Head

should never be kept too hot and he advises having the Head shaved.

If the Eruption does not advance regularly he advises applying the warm Bath to the Arms and Head and even to the Trunk of the Body. — He says he has frequently used it with great Success. —

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He recommends bleeding in a recumbent posture - When Fear and Dejection of Spirits concur with the Disease there is a necessity of giving something of a cordial Nature even at the very beginning and that too sometimes even not sparingly - He says he is no advocate for the Hot Regimen Especially at the beginning of the small pox but observes it must be done in cases where after the superabundant quantity of Blood is drawn off the Pustules thro' excessive fear and oppression of Spirits of the Patients lay buried in the Skin as it were and made no considerable advance for two or three days together - but I know This

must be done in such cases and Blisters
must be applied to remove the sluggish
Oscillations of the Vessels - or the Patient
certainly sinks under the Malady.
Yet in general I am not fond of
blistering early in the small pox unless
there is great Reason to fear that the
Tongue fauces are likely to be greatly in-
flamed with them - When the Disease
attacks with a Ravine, soreness or
great Heat of the Mouth and Throat
and a considerable sharp Rheum
or Stoppage in the Nostrils with
frequent sneezing and a tickling
Cough - this is often prevented by
timely blistering - particularly behind
the Neck and Ears.

But to persons of a lax Habit or having
been previously debilitated from any
cause withhold your Linct. These gen-
erally have a pale sunk countenance
a weak, quick, trembling pulse, and
great Dejection of Spirits with pale
crude whey or Lumped Urine, alternate
Chills and Heat, little thirst and no
great pain but a perpetual heaviness
and sickness at the Stomach, Giddiness &c.
Here sack and Saffron are proper
with some easy cordial and nervous
Medicines sack Whey, Wine and Water
or the like. Sometimes large Quantities
of Wine are necessary - A ^{gentle} ~~small~~ Emetic
will sometimes bring on the Eruption Surprisingly.

The Emetic should not be given antecedent
to Bleeding - and before Plethora is removed -
immediately succeeding the Emetic Cataplasms
to the feet - The Emetic has another good
Effect that of evacuating the contents
of the Stomach and intestines - Gentle
Doses of Salt Rhubarb &c are necessary -
even if a Diarrhea is urgent a little Rhubarb
is necessary - A Moderate Salivation
to be encouraged but to profuse issues
Gargarisms should be diligently used -
Frequent ~~micturition~~ unless proceeding from
Bladders is a very bad Symptom.

In the Crisis ichorosa, indigestible Pox
and profuse Physion where the Skin and
Pustules are pale or livid, the Pulse weak.

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The Urine thin, watery, crude, the Warmer
Medicines are necessary - Such as Pulv:
Contrayerv. C. Myrrh, Musk, Saffron
Camphire, Theriac, Mithridate, Confectio
Cardiaca These are of vast service
in raising the pustules, and digesting
the Matter and may be washed down
with sack whey - Decoct Tuberculd. or
a little Coffee is an excellent thing
for common drink - Small Doses of
Opium are here Requisite - but in
fevers of any Description never ought
to be given in large Doses - as they
produce Supor and Debility - ~~They~~
Opium is infinitely beneficial in removing
irritability &c - They are more useful joined
with opium & Sulfurum &c -

Blisters here should be used freely -
Nitre Lp. N. Dulc. by increasing
flow of Urine often very useful -
Patients who cannot urinate easily
may be often aided by sitting them up -
Diarrhoea should never be checked too
hastily without prescribing a Dose or
two of Rhubarb - and then proper
Astringents as Opium &c.

The never observed acids Veg. or mineral
are useful in the Crystalline Pox but often
found them very much so in the female
black confluent with Petechiae - in
such cases. Cort Peruv. & E. Vite frequently
are very useful - The Bark should never
be given where the Respiration is difficult

the Body very active hard and turned
till these are removed—
He uses the Janet. Coat.

If the Pock assume a dark color and
the temporal arteries throb much no female
Danger is nigh— When the Swelling of face
hands &c suddenly subside and of Pock
assume an unhealthy appearance. the
Danger is great—

Clysters to be used every 2 or 3^d Day.

Anodynes very necessary at and towards
the Crisis

On the Approach of the secondary fever it
takes place at the Tissue of the Pocks
about the 7th 9th or 11th Day from the Eruption
we are often surprised to terrible symptoms
it is frequently to be met in the Lament
if Phrenitic or Pneumonic symptoms occur.

on the contrary if the Pulse sinks you
are to give Quantities of warm Wine -
Gargles - Cyder and Honey - Vinegar and
Water with a little Nitro or crude
Sol. ammoniac - Mustard boiled
in the Gargles is often very useful -
A gentle Vomit is often useful to remove
phlegm - Drinks Wine Whey Cyder and
Water &c - Linen should be often
changed - Opening Doors Windows &c
In the Decline of the Disease Clysters
Remarkably useful -

12

A Dissertation on Pleurisies
and
Pneumonies.

Chap I

Of the Power of the Winds and
Seasons in producing these
Distempers.

According to Hippocrates cold north-
easterly winds bring on Disorders
of the Breast, Sides and Lungs.
~~as also when a cold~~ particularly
if accompanied for a considerable
time with a cold dry season.

Blood drawn in such seasons is constant-
ly found more dense and viscid than
in long and moist seasons.

Asthmatic Persons affected most during
the Continuance of north easterly
Winds.

Cold air shuts up the secretory ducts
of the Lungs and hinders a due Exhalation.
Extreme cold air hath caused an absolute
and sudden Stagnation of the Blood in
the Lungs. and killed almost instantaneously.
When a greater quantity than ordinary of
dense viscid Blood is thrown on the Lungs
and when the Vessels of the Lungs themselves
are inordinately constricted, and the excretory
Ducts and Orifices of the Glands of the
Wind Pipe, Bronchia & are considerably
obstructed, that Peripneumonic Inflammation
will be very readily generated. —

As the Arteries expanded on membranous parts
are extremely small they are of course liable

to be obstructed by a gross fiery blood. and
hence Rheumatisms are very common
in such seasons.

Of the Peripneumony, and Pleurisy - peripneumony.

Huxham says there are very different
Degrees of Peripneumony which demand
a particular attention, and a method of
Cure peculiarly adapted to each.

For a Peripneumony arising from a violent
inflammation of the Lungs, by a very
fiery dense blood obstructing very many
of the pulmonary and bronchial arteries
is quite a different Disease, and requires
a very different Treatment from an
Obstruction of ^{the} Lungs, by a heavy, viscid
pituitous matter; as is the case in what
late writers call a Peripneumonia Maligna

And this again should be managed in a
Method very different from that, which
is proper in one depending on a third
acid Refluxion on the Lungs. There
are some general Symptoms common
to them all, particularly a Load at the
Breast, a short difficult Breathing
a Cough, and more or less fever. Which
few obvious Symptoms however give
the general Denomination of a Pneumony
tho in Nature very different and to be treated
very differently - For in the first Case
Speedy, large, and Repeated Bleeding is
absolutely necessary to lessen the Quantity
and Force of the too Rapid Blood, with
the most cooling, Relaxing, diluting
Diet and Medicines.

— In the second some Blood indeed may be drawn off at the very Beginning, to prevent the further Impaction of the obstructing Lentor, and make Room for proper inciding diluting Attenuants. but if you are too busy with your Lancet, you weaken the Patient, not the Disease, which requires Attenuants, Deturgents, Expectorants, gentle Pukes and proper Purges, with the free use of Stisters, which I think are quite in the former Case, unless towards the Close of the Disease, when they may be sometimes necessary. The third Case may require Bleeding also, to hinder the Advance of the Inflammation; but here the soft, lubricating, demulcent Method, with some proper and frequent Opates in Moderate Doses are demanded.

which in the second case would be utter-
-ly deteterious. —

Great Regard must be had also to the
different Stages, even of the same kind
of Peripneumony, and the different
Symptoms that attend it. For, tho'
at the Beginning of a severe Inflammation
of the Lungs, large and Repeated Bleeding
may be indispensably necessary; yet
if, after the second or third Bleeding.
The Patient begins to spit off freely
a well consorted Matter tinged with
Blood, you are to restrain further Evacuation
that Way — Otherwise you weaken your
Patient without Necessity, and often
entirely suppress the Expectoration to
his utter Ruin — And yet if a considerable

Quantity of thin, fluid, purinous
Blood is spit off, you should draw
more Blood, quiet the Cough with
Cool opiates, as Diacodium, or
the like and give pretty freely
of proper Acids with soft cooling
Incrassants: Whereas if it is a thin,
gleety, dark colored matter that is expectorated,
it is generally a Mark of greater Malignity
and that the Blood is in a putrefying
dissolving State, and will by no means bear
a large Emission of blood.

He advises bleeding from a large Orifice
and to stop on the Appearance of faintness
He, advises bleeding in a recumbent Posture.
That Persons do not bear bleeding as well as
lean and muscular - as neither having so much
of the Red globular part of the Blood. Nor their Vessels

in the animal system

So elastic - The Age and Size of the Person
are to be considered - It would be absurd
to draw as much from a Dwarf as a Giant.
In general

The More violent the Horror or Rigor
is at the attack - the more Violent is the
succeeding Fever. If the Symptoms are
not relieved by the first bleeding after
8, 10, or 12 Hours, more Blood should
be drawn, may even sooner if they
become more aggravated - and this must
be repeated, if the Fever, Oppression, Anxiety
and Difficulty of Breathing increase, or
Continue equally severe - Especially if
the Blood drawn appears very firm and
dense, or covered over with a tough yellowish
Coat or Buff as it is called - which however
very frequently doth not appear till the 2^d or 3^d
Bleeding, tho' the Symptoms may indicate a very high Inflamm¹⁰.

(14)
and this very often happens by the trucking
of the blood down the arm from a small
Orifice, too strict a Bandage or by
the sliding of the Skin over the Orifice:
by any of which the blood is hindered
from spouting forth in a full stream.

This dense buffy appearance of the blood
with a firm strong pulse, will warrant
the drawing off blood, till the Respiration
at least becomes more free and easy.

But if the Crassamentum or concreta
mass is of a very loose texture, and
not covered with a firm coat or Buff
and the Pulse seems to sink, flutter, or
grows more weak and smaller bleeding
it is time to desist and try other methods
of Relief— A thin bluish film on the

Blood, with a kind of soft greenish jelly
immediately underneath (the crust
itself being livid, loose and soft, with
a turbid reddish or green Serum) is
a sign of a very lax Crasis of Blood,
and great Acrimony, which will
bear large Quantities to be drawn
off. — May even a very fluid, thin
loose Blood, that gives off little or
no Serum after standing some time
however specious it may appear to
unexperienced Persons, is far from being
the good Blood they imagine. but
generally argues, in this Disease especially, a
very considerable Advance to a putrid and
very acid State. — For by mixing Sp. S. C.
or Sal Ammon. to Blood from the most

healthy as it runs off, it always
puts on such a florid appearance
and gives off little or no serum. However
long kept, but still remains loose
and as it were half fluid — It
is observable that Sp. C. C. used
frequently, dissolves the blood and
brings on profuse hemorrhages —
A strong throbbing, quick Pulse in Pleur
= pneumonies always indicates further
Bleeding at least to some degree
of ease in breathing or a free expectoration
of laudable matter is obtained. but it
frequently happens that the Pulse, even at
the very beginning, seems obscure and
oppressed, irregular, sluggish, and sometimes
intermitting, the Patient at the same time
complaining of great weakness and Oppression

which would seem to contraindicate
bleeding; and yet the Lead at the
Breast, Difficulty of Breathing, great
Anxiety and Heat felt about the
Præcordia loudly demand it.

This often puzzles the young Practitioner
but he should consider, that such a
sudden Want of Strength, Spirit and
Pulse, doth not arise from Want of
Blood, as the Duration of the Disease
for a few Hours, or a Day or two, cannot
be supposed to have exhausted the
Vital Fluid to any considerable
Degree - The Truth is not the Defect
But the too great Quantity of Blood
in such cases is the real Cause
of these Symptoms -

For the Blood Vessels being overloaded with
 Humors, and distended beyond the
 due Force, cannot act with sufficient
 Vigor. The Aqueductum between the
 Solids and fluids being not
 duly kept up, the Moving Vessels
 are unable to protrude the Blood
 with a due Force. Just as too great
 a Weight on the Embolus of a Syringe
 hinders its free play. In such
Letting Blood is so far from weakening
 that it really raises the Powers of
 Nature; as is always evident on
 drawing Blood from plethoric
 Persons, labouring under an Oppressed
 Pulse, as it is properly called, which
 is found constantly to lie on bleeding.

In some very violent Peripneumonies, where
both the Lobes of the Lungs are greatly in-
flamed and obstructed, an immediate and
excessive weakness comes on, with an
inexpressible anxiety, and oppression at
the Breast, a very small, trembling Pulse,
Coldness of the Extremities, with clammy,
Coldish, ventral sweats, the Eyes staring,
Jaws and inflamed the face bloated
and almost livid; and all this soon
followed with Stupor, Delirium
and I have seen in some cases (the few
indeed) with a complete Paraplegia.

This is in truth a very dreadful case, but
doth not arise from want of Blood, but
from want of a due circulation and
Distribution of it. For there being so many

and great obstructions in the Branches of
the Pulmonic Artery, the Blood is ponded
up in the Lungs, and hindered from passing
freely, as it ought, from the Right Ventricle
of the Heart to the Left: so that the Aorta
and its branches do not receive Blood
enough to carry on the Common Offices
of Life, on which soon follows and ab-
solute Stagnation and immediate
Death. Dissections have shewn this to
be the Case, the Lungs have been found
quite stuffed up with Concreted Blood,
red, hard, and as it were fleshy or rather
of the colour and consistence of Liver, and
so heavy, that any part of them will sink
in Water. — If any thing can be

in the most deplorable case, it is by
early and immediate bleeding, or
it becomes in a very hour utterly
irrecoverable. — I have seen found
surprisingly good Effects from bleeding
in both Arms at once. when done
in proper Season. —

And yet there are some kinds of Peip-
=neumonies, that will by no means
bear large bleeding. as has been noted
by Physicians of the best authority.

And I have observed the same in several
Epidemic Peipneumonies, particularly
in the latter part of the Year 1745. and
the Beginning of 1746. During which we
had an Epidemic Peipneumony, in which

after a second bleeding / and sometimes
 after a single bleeding / The Pulse and Strength
 of the Patients sunk to a surprising Degree
 and they ran into a sort of nervous Fever
 with great Tremors, Subsultus Tendinum
 profuse Sweats, or an Attribilious Diarrhea
 with a black Tongue, Coma or Delirium
 Tho at the beginning the Pulse seemed to be
 full and throbbing and the Pain, Cough,
 and Oppression so very urgent, as to indicate
 Bleeding pretty largely strongly. Now in
 these cases the Blood was seldom found ~~but~~
 to any considerable degree, but commonly very
 florid, but of a very loose and soft consistency
 or very dark colored, and coated with a very
 thin and bluish or greenish film, under it
 was a soft greenish Jelly and a dark livid

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crust at the bottom. - Sometimes indeed
the coat was much thicker and more tough
but of a pale red color resembling the coralline
stone or dilute jelly of red currants.

This last appearance I have frequently
Noted in Real Pleuro. Peripneumonies.
Whenever I see such a loose dissolved Blood
I am very cautious how I advise further
Bleeding, especially if I find the pulse
or the Patient become more languid after
it, however the Oppression, Load or even
Pain, may seem to require it. - It
was from Observations of this kind
that Lancisi, and Baglivi from him
Caution against further bleeding, when
no fery Coat appears on the Blood in the
second Bleeding. -

And I concur with Baylini in the first
parts of the Prognostic as well as the last,
having always found the very fluid
Blood, drawn in the beginning of pulmonary
fevers of very ill Outcome; for it shews,
that either the Crasis of the Blood is very
much broken and dissolved, or that the gross
inflammatory Blood sticks in the Pulmonary
Arteries, and that nothing but the very thinnest
and most serous Part can transude and
pass into the Left Ventricle of the Heart.
I cannot but observe however that sometimes
in Peripneumonias and Pleuro-pneumonias
the first and even the second Blood
shall not appear buffy, and yet the
third shall be very sooty, and this particularly
if the Blood trickles down the Arteries and
doth not come off in a full Measure.

but then it is ever to be observed that this
blood tho' apparently florid, when cold. is
very dense and tenacious,; whereas ~~in the~~
Case I mentioned above the blood
tho' very florid, was of a loose and soft
texture, and never formed into a
regular firm coagulum.

Such ^{blood} was frequently drawn from sea-
sailing Persons in the beginning of the
Year 1746* and was always attended
with very ill symptoms, very often
fatal — Such Malignant Pneumoniae
indeed very frequently happen to Sailors
after long Voyages, and to Persons very
Scurvitic. in such Cases large bleeding
is not likely to be successful.

Though the appearance of a pretty thick
fibrinous coat on the blood is in general
no ill symptom in Pneumonic fevers.

Yet when it is excessively tough, and extremely yellow, or of a pale lead color, it threatens Danger, and shows the inflammatory Scurvy is highly wrought up - and vastly difficult to be resolved or attenuated -

When the Pain remains almost as violent as ever after the 4th or 5th Bleeding, and the globular part of the Blood hath been so reduced, as that the Crapmentum hath scarce been a sixth part of the Volume of the whole Blood and yet as solid as a piece of flesh - These cases are generally mortal. - If after the 2^d or 3^d Bleeding, or after the first, your Patient begins to spit off freely a yellow concocted Matter.

lightly tinged with Blood - stop them
and particularly if the Breathing becomes
free, as it commonly doth - otherwise
You will weaken your Patient to no
purpose, nay to a bad one and quite
suppress the Expectoration, by which Nature
is now throwing off the Disease by the
most proper crisis and ready Outlet.
The obstructing Matter in the Extremi-
ties of the bronchial and pulmonary
Arteries being so far resolved, concocted,
or digested, as to pass off freely into the
Cavities of the Vesiculae, Bronchia &c.
and be up and out of the Trachea
by cough and Expectoration. That there
is a passage from the bronchial Arteries, into the
Cavities of the Trachea and its ramifications, is

evident, for the oily mucus which in a
natural state lines and lubricates the
internal Membrane of the Aspera
Arteria and its Branches is separated
from the bronchial Arteries — so
the matter is thrown into the cavity
of the bronchia and so out of the
Lungs by expectoration. — For I think
it is pretty certain, that some Hemoptoes
do not arise from a Rupture of the Vessels
as no manner of Pain, Pericardence,
or the like precede, succeed or accom-
pany them.

It hath been ^{an} Observation of the very Nurses
that all those who spit Blood do well.
However this is not always true — for when
ever either very frothy, or finew fluid blood is
spit up, or black and partly Coagulated, sperry

liver colored Blood, it is quite otherwise.
Extravasated Blood remaining in the Lungs
becomes a putrid Serum that destroys the
very Substance of the Lungs. Bleeding is
of very little use when an Abscess is forming
particularly when the Phlegmon is so far
advanced as not to be resolved — indeed
Bleeding is then rather disadvantageous
as retarding the Next operation of Nature,
to free herself from the Offending Stagnant
Matter, by a kindly Suppuration. For by this
Means the Matter is made to stagnate longer
and to grow more and more acrimonious
which at length by affecting the adjacent Parts
forms a much larger Imposthume than would
have happened at first, if Nature had been left to
her own regular proceedings: very many times
it ends in a downright Gangrene.

and sometimes is an obstinate Schirrhus,
making the short Remains of Life extremely
unstable. After the 4 or 5th Day of a true
Pneumony Bleeding is of little avail
to prevent the Suppuration. For most
Phlegmons begin to suppurate in that time
if not resolved before. This will more
especially and sooner happen in such a part
as the Lungs, surrounded on all sides by
warmth and moisture, and so near the
Heart acting on the inflammatory Ob-
-struction with constant and great force.

So that where the Pneumonic Symptoms
continue with great Violence for four or
five Days or more successively, an Abscess, or
Necrosis, is justly to be feared, and little
Advantage is to be expected from further Bleeding.

But yet, if either the Pain returns
with Violence after having ceased a
considerable time or seizes another part
of the Breast; it is an Argument that
a new Inflammation is forming, which
indicates Bleeding as much as the former
tho not to the same Degree for this
Accessary Seizure being altogether of the
same Nature, and on the same Organ as
the former requires the same Method to
prevent its advance and further its
Consequences. — The Strength of the Patient
and Pulse, The Violence of the Pain,
and difficulty of Respiration, are in
a great measure to determine the Quantity;
and some Regard must also be had to the
color and consistence of the Blood and the

Quantity and Quality of the Serum. I have
sometimes ordered Bleeding the 9th or 10th
Day from the first attack, and found the
Blood almost as fiery as what was drawn
the 2^d or 3^d and that too when the Lanet
had not been tumourously used.

But the Crapamentum the exceeding
tough, was greatly reduced in the
proportion it bore to the Serum.

It is commonly observed, that as soon
as the secondary attack and Pain come
on, with any degree of Violence, the
Expectoration the before free and copious
ceases altogether, or is performed with
great difficulty. The Violence of the Pain
not suffering the Thorax to be duly expanded
and the Muscles of the Lungs, Breast & Abdomen

to act with sufficient force to eject the Matter.
Not to mention that the Inflammation
hinders a due secretion of the lubricating
Mucus, which should naturally be
Separated to smooth over the internal
Membrane of the Trachea and Bronchia
and expedite the Discharge of any Matter
Contained in them. — and we eventually
find that, after the Inflammation is abated
by Bleeding, the Expectoration Returns
with Ease and Freedom. So that in
Pneumonias and Pleuropneumonias
you are chiefly to make your Evacuations by
Bleeding before the fifth Day. If on
fresh Attacks of violent Pain, difficult
Respiration and suppressed Expectoration,
you are to begin again with venesection,

but with great caution and moderation:
 As all Relapses in these Cases especially, are
 dangerous, the Sick growing daily weaker
 and less capable of bearing any considerable
 loss of Blood, and therefore it will be
 very imprudent, upon every little pain, to have
 Recourse to Bleeding; for now or less pain
 continues, particularly after Pleuro-peripneumonia
 very often, a long time after the fever is quite
 gone off: But Bleeding is, in a particular
 manner less proper when a copious Ex-
 =pectoration of laudable Matter goes on
 pretty easily, tho it should still continue
 tinged with blood, for the Reason I hinted
 above; viz. that it indicates the Resolution
 and concoction of the Matter of the new
 Inflammation. Nay it is for that very
 reason to be avoided, tho often imprudently

ordered, and Aliments stupidly administered:
to restrain this slight Singe of Blood:
but its by Persons who have very little
attended on Nature's Operations, and
up to Hippocrates her great Interpreter.
It is without all Doubt vastly more
proper to alleviate the Pain and the
Importunity of the Cough by gentle
Opacates, cooling, soft, Demulcents,
and easy Expectorants. After general
Bleeding has been carried to a con-
siderable extent - Topical Bleeding
he recommends - as Bleeding in the
Laphena. - Cupping &c. - In asthmatic
coughs, Defluxions on the Lungs &c
he recommends Blisters, Issues, Letons
cupping &c.

Besides Bleeding - Nitrous Medicines ^{are} recom-
mended, together with a moderately cool
free Air, and as much quiet as possible
both of Body and Mind. Large well
aired Rooms are very beneficial. —

The more easy, early and large the
Concocted Expectoration is, so much the
better. — Indeed generally at the Beginning
it is crude and thin, but soon becomes
of a whitish Yellow Color and greater
consistency; When Matters proceed tightly
and about the third it is commonly streaked
with Blood: or the Blood is so incor-
=porated with it as to give it a bloody
Tinge — This Kind of Matter when freely
spit Off, gives great Relief to the Respiration
Pain and Oppression at the Breast, and generally
terminates the Disease in Seven Days.

In the animal system

But nothing more effectually promotes Resolu-
=tion (by attenuating and resolving the
impacted Matter/ than drinking freely and
frequently of cooling, relaxing, and gently
saponaceous Diluents; such as thin Whey,
The Barley Pissar with Licuorice,
Pys &c. The Decoction, or rather infusion
of the pectoral Herbs as Ground-hoy.
Maiden Hair, Colts-foot - Hyssop &c.
These should be acidulated with Lemon
Juice or Seville Orange - Honey be
Consider very useful - and its griping
quality may be entirely removed by
boiling - ~~Drink~~ Any of these drunk
warm and taken in frequent but small
Draughts - sipping them as it were perpetually.
Hippocrates recommends Barley Water, Honey &
Water, Oxy-mel, and Vinegar & Water. -

I have known/He says/ the Turn of
Vinegar itself of no small service in
Malignant Peripneumonies. The
Steam of Camphorated Vinegar is
no contemptible thing in many
Cases. "I have several times given
an Emetic in Peripneumonies with
great advantage, when the Expectoration
hath been suddenly suppressed, and the
Difficulty of Breathing greatly aug-
mented - but it was when a proper
Quantity of Blood had been drawn
Antecedently, had the Violence of the Fever
Abated: - but in such Cases very little
should be drunk afterwards to promote
the Vomiting - He recommends Oxy-mel Scitit.

The utmost care should be taken never
to give strong Expectorants in the
Beginning of Peripneumonies, till
proper Bleeding &c may have allayed
the impetuosity of the Blood. and lower
otherwise they will increase the Inflam-
-mation and Danger of Suffocation
and eventually intercept what
they were designed to pump up. The
Matter should be first concocted
and then expectorated. Another
thing is to be observed that we do
not bring on any considerable Pusiness
which will certainly suppress the
Expectoration and endanger the
Patient's life.

Some kinds of Expectoration are of very
ill Omen it is particularly a very ill

sign, when much sincere ~~blood~~ florid
or frothy Blood is spit up - and thus
it is pronounced by Hippocrates and
Aretaeus; tho' they both speak so
favorably of the concocted matter
that is expectorated with a bloody
Singe - This fresh frothy Blood proceeds
from a Rupture of Arteries in the
Lungs - now if Arteries are burst into
the Lungs, the Blood gushes into the
cavities of the Bronchia, sometimes in
such quantities as to occasion a sudden
suffocation if not immediately spit up.
Hippocrates declares such a kind of
Expectoration exceeding dangerous,
And mentions a case of Person who

at the Close of a Peripneumony, by
one Mr Clark / Who spit up pieces
resembling boiled Spleen. rather
more spongy but very foetid. He
died the 19th Day of Disease —
Many times Vessels are broke in the
innermost Receptacles of the Lungs, part
of which may indeed be soon spit
up fresh and florid, but much is
very apt to remain in the ultimate
Communications, and cellular inter-
stices of the Bronchia — which stuffs
up the Lungs, compresses the surrounding
Blood Vessels, and at length putrefies
and corrodes all around it —

Q^u
as soon therefore as this Expectoration
of florid Blood appears, I immediately
direct Bleeding in such quantities as
are adapted to the Strength of the Patient
in order to abate the too Rapid Motion
of the Blood, lessen the Inflammation
and prevent as much as possible the
further Effusion of Blood amongst the
Pulmonic Vessels where it would
do infinite mischief. — Besides
this Nitrous Medicine — And of
A Decoction of Red Poppies acidulated
with Eluv. &c. makes an admirable
Drink in such Cases. — but disapproves
of the use of Opium in large Doses in
such Cases.

In the Catarrhal Peripneumonias he
recommends Purges - Cough attended
with thin Disfluency - Elixir Asthmaticum
with Spermaceo. &c - The Putrid
Peripneumony to which Sailors are
addicted will not bear repeated
bleeding - in such Cases Bleeding
not useful - Diluents and the
Vegetable and mineral Acids,
very efficacious -

Matter should be spit off early and
easily in Peripneumonias and
Pleurisies, the colour of it should
be a yellow well mixed with ^{spittle}
or a concocted yellow Matter that
is tinged with some but not too much
Blood.

the sincere yellow unmixed spitting is bad:
when very bloody or livid it is dangerous.
The sincere yellow unmixed spitting is
bad; when very bloody or livid it is
dangerous: especially when this appearance
is very early but that which is quite
black is worst of all. It is an ill sign
also when it is very green. Whatever is
Spit up with great difficulty, violent
cough, and no Relief to the heaving
and Oppression, shews the Case to be bad.
He recommends blisters very warmly -
but a profuse diarrhoea is unfavorable
to suppress the Expectoration &c -
and considers a Diarrhoea a bad Symptom

the Body
He observes that should not be too
Cotivie on Account of the Fever
nor too loon on acct of the Expec=
=toration and the Strength of the
Patient failing — "for when there is
a great flux of Humor downwards
the superior parts grow dry, the Spitting
Ceases and the Sick die — Hippocrates
Sometimes the Morbid matter is cuticallly
translated to the lower parts, producing
Phlegmons, Imposthumes, Erysipelatous,
or edematous Swellings, Ulcers &c.

Particularly in Persons formerly subject
to Swollen or sore legs which are frequently
noted to swell or break up again at the

of Pleurpneumonia Disorders, to the great
 Relief of the Breast: drying up Ulcers
 in the Legs ~~the~~ suddenly the Lungs are
 apt to be forthwith affected and Hydropic
 Tumors of these parts forced up by laced
 Stockings immediately bring on asthmatic
 Complaints - A Derivation to the Legs by
 tepid Bathing, Blisters &c are very useful
 in Affections of the Breast - He observes that
 Blisters on the Legs that ulcerate freely have
 been found to be frequently useful -
 Drying up Blisters suddenly he says often
 produces colliquative diarrhea.

Pleurpneumonia Notha.

Great Load at the Breast, Breathing very
 difficult, and the Cough severe, Fever and Heat
 are small, many times scarce perceptible, the
 Pulse either quick, weak, and small or sluggish

In the principal system.

and Oppressed, never hard and tense
Commonly furies the old and phlegmatic
the weak and lax, the fat and unwieldy
and one most ripe in wet, flabby, foggy
weather and Winter Seasons - Whereas the
true inflammatory Pneumony generally
attacks the robust, vigorous and active
and is most frequent in cold dry weather
during North East Wind, and high Stations
of the Barometer - This Disease viz
Bastard Pneumony / seems to have its
Origin from a putridous Linter of the Blood
and a Topy Disposition of the Lymphs
and Serum is being greatly redundant
from suppurated Putrefaction - is thrown
on the Lungs faster than it can pass off
and congest and obstruct the Pulmonic Vessels

tille at last a fatal Stagnation ensues
and Death is the consequence - instances
of this kind occur in Girls labouring under
leucophlegmatic Chlorosis. —

The Physician must be regulated by the
Pulse in Bleeding - with a rapid, strong
or quick and tense pulse, it should be so
freely used Especially if I previously
knew the labouring Person to be of a
weak, low or Phlegmatic constitution
but when with difficult, ^{hot} Breathing
Cough &c a full strong, pulse or a very
tense & hard one a strong and Vigorous
Person the Lancet may be much more
freely used - So that when the Pulse is
weak and low, the Heat little, or not
considerable above the Natural, The Urine

in the animal system.

pale or crude and so on - I must proceed
with great caution in Bleeding a
Pulmonic Patient, tho the head and
oppression at Breast may be very im-
-gent - And in Event when Blood is
drawn from a Person under fastid
Pneumony it either appears loose
thin and florid, or more commonly of
a dark livid Hue, and not coated over
with a thick viscid Buff as in common
Inflammations of the Lungs - And
it is observable that the Patient soon
sinks, and grows considerably weaker
after such an Evacuation tho for the
present seemingly relieved as to the
anxiety and Load on the Praecordia
and it is certain that common catarrhal fevers
in which a ferous Colluvies abounds will

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not bear very large Bleeding, much less a
Peripneumonia Notha when a slimy
Pituita is redundant — Physician
I should be on their guard in respect to this
Complaint the Misdeeds of the symptoms
at first are apt to mislead — it has some-
times been taken for a mere fit of Hys-
-terochondriacism — But when a perpetual
laborious Wheezing, great Anxiety and
Constant Oppression on the Præcordia
Constrictive symptoms, Cold Extremities, and
dark lead coloured Nails and Visage
are come on, the Physician must be
more stupid than the Patient not to see
the immediate Danger.

I think in general more or less Blood should
be drawn in the beginning, but during the
operation the Patient should be kept in a
recumbent posture by which Means faintness is
avoided.

in the animal system.

but as to the repetition of Bleeding we
should be very cautious and well consider
the State of the Blood, the Strength of
the Pulse and Patient before we advise
it - it is undoubtedly sometimes necessary
- we are frequently obliged to bleed the
- heated in asthmatic Paroxysms -
Blisters should succeed Bleeding -
an Infusion of Pectoral Herbs, as Ground
Ivy, Hyssop, Pennyroyal, Liquorice
or a thin Mustard Whey sweetened
with Honey and sharpened with
Lemon, are proper for common Drink.
as it commonly attended with frequent
Urges to vomit - This should be encouraged
indeed Vomits are often very efficacious
after some Blood has been drawn

a Spoonful or two of Ox ymel Sul-
-luratum or Vin. Ipecac. with a few
Draughts of Mustard Whey - or the like
are sufficient, a large Quantity of any
Kind of Liquor should not be drank
This jumps up the Petrieta &c -

Vinum benedictum or Antimonii
he considers highly useful as an
Emetic Judiciously &c - he says from 10
to 50 or 60 Drops it is an abundant
Alterative Diaphoretic and Diuretic;
a few more gently purge; and every
one knows a large Dose strongly Vomits
In good hands it will certainly do
great things - The timid, low, insipid
Practice of some is almost as dangerous
as the bold unwarranted Empiricism

of others - Time and Opportunity ^{often}
to be regained are often lost by the
former, whilst the latter by a bad
Pulse sends you off the Stage in a
Moment. But as Bleeding is on
the one hand is ^{to be} used with caution
in this Disorder so on the other are
very heating and stimulating Medicines
especially at the beginning of the Disorder
- per- otherwise not only the Oppression
on the Breast is greatly increased, but
a comatose Disposition is ^{readily} ~~already~~ brought
on.

Blisters should never be neglected in a Pneumonia
Natha, as not only serviceable from their attenu-
-ating and stimulating locality but as drains
to the Morbid Collection.

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a large Blister to the Neck should always
be set on at the beginning, and Quinquina
to the Legs and Thighs are often found
to relieve the Head and Breast when
other Methods fail. But as it frequently
happens, in this Disorder, that the Limbs
grow torpid and coldish a very bad
Symptom! They should be well
rubbed before the Blister are laid
on and then well wrapped up in
flannel / which by the way is frequently
also necessary in low nervous fevers
for this very much promotes the Tiding of
the Blisters and the consequent Discharge.
When comatose Symptoms remain - and
a very difficult Respiration, you may draw
off more Blood by cupping and scarifying

In the animal system.

the Neck and Shoulders, when you
Cannot venture to Open a Vein again.
Frequent Stools are certainly useful in
this Disease: Sydenham advises purging
every other Day - but I think this is
overdoing it - The Bleeding and Purg-
ing too may be necessary at the Beginning
yet it is seldom proper to repeat
the former and the latter must be
managed with some Caution,
especially when repeated. For the
Patient is apt to fall into fainting,
Cold Sweats, &c unless properly supported
during the Operation - with some
Nutritious Drink - There is one thing
to be observed as to both these Evacu-
ations

and that is if the sick spit largely
a concocted Matter in is sometimes
the Case even in this Peripneumony
Neither one nor the other is proper
and laxative Glysters or mild Ec-
coprotics only should be given
and then Mustard. Whey Hydromel
or pectoral Decoction, with a small
Quantity of soft white Wine in them
should be given frequently to promote
it. Hippocrates, in several Places, advises
Hydromel and sweet and watery
Wine in Pleurisies and Peripneumonies
to promote Spitting -

Nitre, Spum. Ceti - Cinabar. Saffron

Pulv. Contrayerva. Camphire - Lac
Ammoniac - Elecampane - Hops
Liquorice in Decoct. - The saline
Draughts. & Lemon Juice Quater
and oily Medicines are best here
and so are the highly stimulant and
Volatile if given too early, tho they
sometimes have a good effect towards
the End -

Of Pleurisy

a Pain on either Side of the Breast
attended with an acute fever, is commonly
called a Pleurisy and then whether it
arises from an inflammation of the
intercostal Muscles, the Parietum of the
Ribs or the Pleura itself is lost in
the only true Pleurisy, the former is

being a species of an inflammatory
 Rheumatism, and are called Costard or
Spurious Pleuritis. - However as they
 greatly affect the Respiration, when violent,
 they are always attended with much
 more ill Consequence than Rheumatic
 Pains in other parts of the Body, and
 demand a particular regard, and
 a speedy Removal. For as the Violence
 of the pain hinders a due Expansion of
 the Thorax, the Respiration is immediately
 affected: hence the Lungs not being sufficiently
 inflated, the Blood cannot pass freely from
 the Pulmonic Arteries to the Pulmonic Veins,
 and so into the left Ventricle of the Heart.
 Whence a Congestion, and some degree of
 Stagnation of the Blood in the Lungs will arise. -

In the animal system.

Now as the right Ventricle of the Heart is
Continually throwing more Blood into
the Pulmonic Artery, its branches become
more and more distended, till at length
they are rendered so very turgid, as to
press on and obstruct the branches
also of the bronchial Arteries; and
thus an inflammation of the Lungs,
or a complete Pleurisy, is often
the Consequence of a true or bastard Pleurisy,
especially when the Blood is very viscid.—
Indeed whatever interrupts a free Inspiration
and Expiration is apt to produce this. Thus
oftentimes a Quinsy brings on a Pleurisy.
the free Passage of the Air ^{thru} the Glottis into
the Lungs being obstructed.— Hoffman

takes Notice that even flatulent and
spasmodic Colics, continuing any time
are often succeeded by Pleurisies and
Peripneumonies. The Pains, Spasms,
and Flatulences impeding the free
Action of the Diaphragm. and
hence also as he says, by hindering a
due passage of the Blood through the
Viscera of the Abdomen by which
too much is thrown on the Lungs, Pleura
&c. — ~~It sometimes~~ And Pleurisies of are
very apt to become Pleuris. Peripneumony

Indeed it sometimes happens, that upon the
Coming on of Peripneumony, the Pain of
the Side ceases, which may happen, when
the infarction of the Lungs is so great, that
little Blood passes from the Tight Ventricles

in the animal system.

of the Heart to the left, and the Aorta
is not half supplied with blood. ~~so~~
that the Powers of Nature sinking for
want of it, all tends to an universal
Stagnation, and the Patient become
as it were insensible, or as Aretaeus
says, Complain of Nothing, though
their Pulse intermits, and their Extremities
are cold. I have seen several such
instances. "About four years since
one Mr. Cam a Sailor, was seized
with a complete Paraplegia about
the ninth day of a Pleuro-Pneumonia
and about 24 Hours before his Death.
It is a fatal Symptom therefore when
the Pleuritic Pain suddenly ceases, and
the Difficulty of Breathing and Load at Breast
still continue or increase. -

-and the following Aphorism is
most certainly true "A Peripneumony
supervening a Pleurisy is dangerous."

The Inflammation of the Pleura may
be diffused from one part to another as
to that part which immediately covers the
Lungs. The mediastinum is but a Duplication
of the Pleura and an inflammation
may attack any part of it, or be pro-
-pagated to it. in which Case very acute
Pains are felt under the Sternum or between
the Shoulder blades; this we sometimes
meet with and is generally attended
with great Danger. - Both, Hippocrates
and Aretaeus take Notice of a Dorsal
Pleurisy, in which the Pain shoots from
the Spine to the Breast Bone attended with

Orthopnea, cough, and a very difficult
and small expectoration. Sometimes
the Pain is forward and directly under
the Sternum where the Mediastinum
is attached to it and in consequence
of it Apertures have been found in
that Part. When the Pain seems to
lie very deep in the Chest, with a
great Sore and Anxiety, Palpitation
of the Heart, and a constant inclination
as it were to raise a cough, the Pericardium
(the external membrane of which is also
from the Pleura) is commonly inflamed.
When the Pain is spread all over the Breast
with a great oppression, and perpetually
darting pricking pains here and there - not
only the Mediastinum but the external

Membrane of both Lobes of the Lungs seem
to be inflamed. The great difficulty of
Breath, Load and anxiety, perpetual
cough, and constant desire of sitting
up erect, shew this to be the Case; and
a very dangerous one it is as well as an
inflammation of the Pericardium.

4^{thly} The upper Membrane of the Diaphragm
is likewise from the Pleura, and may
either primarily inflamed, or secondarily
from the inflammation of the Pleura,
and this certainly happens more commonly
than is imagined. - This is called a Pleur-
-itis, and is attended with a very
acute Fever and a very violent pain
extended from the lower Ribs to the
lowest Vertebra of the back, a short

Convulsive spasmodic kind of breathing
a vast Anxiety and Uneasiness, dry
Cough, Hiccups and Delirium. and
excessive Pain is particularly felt on every
inspiration, which darts itself from the
Sit of the Stomach to the very Loins.
The Hypochondrium of the Side affected is drawn
inwards, and upwards, under the Ribs, and
the Abdomen is scarcely perceptibly moved in
Respiration, but remains fixed and
Convulsed as it were by the Violence of
the Pain, in attempting an Inspiration.
A Pleurisy or Peripneumony may be
generated by an inflammation of the
intercostal Muscles or Pericostum of the
Ribs. Indeed in these Cases the Peripneumonic
Symptoms may not immediately come on

nor commonly do they till after two, three, or four Days- but as the inflammatory Pain hinders a due Expansion of the Thorax, and a sufficient inflation of the Lungs, they at length also may become greatly affected. - In such Cases it is necessary to resort early to large and Repeated Bleeding, Nitrous Medicines &c - Fomentations, Opacates &c. - In a word we should treat the Case as a mere inflammation of the Membranes Muscles, or Periosteum; But, when a Cough at Breast, Cough, Expectoration &c. come on we must have a regard to these also, as well as to the pain of the Side &c. -

In the animal system.

The Distinction of Pleuritis into true and
bastard hath a Real foundation in Nature
and is of some import in practice; for
when the intercostal muscles only are in-
flamed, much more is to be expected
from topical applications, Blisters, Cupping,
and the like, than when the Pain of the
Side is from an inflammation of
the Pleura or external Membrane
of the Lungs. - The soreness to the touch
the Pain on lying on the Affected Side
and chiefly on a full inspiration.
The Tumor and Redness of the part
which sometimes appear, distinguish
this from the internal Pleurisy.
Beside there are some pains of the
Side, and those too pretty severe, which

arise from a sharp acrid Defluxion on
the Muscles of the Breast and the pericostum
of the Ribs; and which must sooner
give way to topical Applications,
edulcorant Medicines and proper purges
than to Bleeding, which in such Cases
is no further Necessary, than to take off
a Plethora, if it subsists. Indeed when
an acrimonious Humor is the Cause
you may bleed and bleed on to very
little purpose, but that of weakening
your Patient. Will Bleeding cure stomatitis
scorbutic or Venerereal Pains? It may as
well remove the Pain from a Rotten
Tooth, or a Thorn in the Flesh.
The anesthetics will be distinguished between

in the animal system.

rheumatic, or flatulent Pains about
the Breast and Side, and the truly
pleuritic, Hippocrates justly styles
them, Αλγμπασα ισχυως εσπικασα
ασπια, and forbids bleeding in them.
These they attempted to Cure by fomen-
-tations, Purgings &c. and not by
Bleeding; whereas the fixed, systro-
-phic Inflammation inflammation
of the Breast as the Commentators
Call it always Requires Bleeding.
Pains in the Side attended with
Peribronchi frequently require nothing
than more than Clysters or gentle laxatives
to perform a Cure. — Bleeding in such
Cases generally increase the Pain and
Flatulency —

But in all these cases the Pulse, Degree
 of Fever, The Tongue, situation of the
 Pain and manner of Breathing, pretty
 clearly discover to the judicious Practitioner
 what is the Matter and what is to be done
 — When the Pain of the Thorax is violent,
 the Pulse hard, tense and quick, the Fever
 high: the Pains may be pronounced
 pleuritic, especially when a Rigor
 preceded — True pleuritic Disorders almost
 always begin with a Rigor and the pulse
 is very hard and tense like the Vibrations
 of a Cord — The Pains are very sharp,
 sticking and fixed, not tensive and shifting
 as the flatulent. — nor uncertain, wide
 and wandering, as the Rheumatic. —

The Hardness of the pulse is one of the most pathognomonic signs of an Inflammation of membranous Parts; when therefore pains lie under the Sternum or shoot from the Spine to the Breast Bone, you may guess the mediastinum is inflamed, by the tension of the Pulse.

Cure of Pleurisy

Bleeding according which must be regulated in the Quantity according to the Strength of the Patient, Pulse and fever the Violence of the Pain and Difficulty of Breathing - The Quality of the Blood should also be particularly inspected for a dense fiery blood not only indicates an abundant quantity of the Red Globules but likewise its inflammatory Disposition

and that the Patient if need be, can well
bear large and repeated Bleeding. —

An Emollient Cooling Clyster should
immediately succeed Bleeding.

After this the pained part should be
fomented with a Decoct. succ. Lin.

Tenugreek. Flor. Cham. in Milk and
Water. — This was the ancient Practice.

He prefers humid fomentations to the
dry and hot. After which he applies
he applies an anodyne Plaster.

Opium ℥i.

Camphor ℥i. — Ess. of Cloves

After due fomentations, with very good success.
but always first try the humid Foment.

Nitrous medicines — This whey — Barley
Water — a Decoction of Barley and Red Poppies.
he uses Oils. Paregor: early in the
Dysuria to mitigate pain

in the renal system.

Supposing that the Benefit derived in the
way is more than counterbalanced then its
Effects in increasing the inflammation.
He considers pain a stimulus which
greatly quickens the Circulation, and
Derives likewise more than natural to
the pained part. When a sharp Cough
attends it should be mitigated by
Diacodium or the like. else the
great Agitation, it causes will also
increase the inflammation. They however
demand some degree of Caution and
Prudence in the use of them. — therefore
ever remember, before you enter upon
them, the Lancet is not to be sparingly
used, when the Pain is very violent
the pulse very hard, quick and tense, and
the Fever high. —

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He says - About 4 years since a strong
Philthoric Gentleman, about forty, was seized
with a fever and violent Pain of his Side
he was immediately bled to 16 or 18
Ounces - This abated the Pain - He got
up, sat by the fire in a smoky Chamber
dronk near a quart of Cold Beer, fell
into a vast Rigor, succeeded by a high
fever excessive pain of his Side and
Breast, great difficulty of Breathing
Delirium, and the most incessant
terrible Cough & even haemorrhoids
pumped up great quantities of fresh frothy
Blood - I was obliged to bleed him
three times in 24 Hours and to give him
seven grains of Solid Laudanum

besides 2 or 3 ounces of Diacodium in
that short space of time - And this, and
this only / (for he would take no other
Medicum) happily recovered him -

This indeed is a very extraordinary
instance - but the Method which is
above recommended, I have in a
Multitude of Cases experienced to
be very safe and effectual. In
several Epidemic Pleurisy, I have
known very sweating, Especially after
the third or 6th Day of very great Advantage
and with this View, have often added
Camphire to the Miste &c which joined
with small Doses of Elis. Purg. out
of this warm way, Ptsian, seldom
or never fails of answering the intention.

In general we find they sustain the loss
of Blood with much better Effect and
less inconveniency in a cold dry Spring
than in a Wet Summer, or a Raining
Autumn — May there are some Pleuritis
at least vulgarly so called, that will
admit of little or no bleeding — in
which the pain of the side seems a mere
Symptom, not the Disease; —

Aesculapius observes that the People of Rome
and Athens did not bear bleeding in
Pleuritis and Peripneumonies as well
as those about the Hellespont; the former
lying to the South, and in a much more warm
and moist Air than the latter, who were
much exposed to Cold dry northerly and
Easterly Wind —

without all Doubt the very Constitution of
the Solids and fluids differs Considerably
according to the different Situation of
the inhabitants. — Upon the whole then let
me add this Corollary, that in practice
we not only ought to Consider the
peculiar Nature of the Epidemic, but
also of the season, and the Constitution
of the Patients. — Speaking of the
Use of Opium he says — "The Violence of
pain unquestionably demands the use of
Opium, after Bleeding, which prudently
interposed are certainly of exceeding great
Service."

A Method for preserving the Health
of Seamen in long Cruises and Voyages.

It is found that the Officers, who carry
wine Cyder, fruit &c are least liable to
Ferbrile affections — He recommends
serving the Crews in Cider, good sound
a pint a day — besides Beer and Water
Vinegar & Water &c — In Case of
Sinking Water, Juice of Lemon
Elixir of Vitriol should always be
Mixed with it. — The Romans Soldiers
drank Posca viz Vinegar & Water —

A Dissertation
on the
Malignant Ulcerous Sore-
Throat. —

In the Year 1752 he mentions an Epidemic
Febris Anginosa, which raged up and down
with great Violence attended with scarlat
or pustular Eruptions, and succeeded with
great itching and Desquamation of the Cuticle.
In this the pulse was commonly hard, quick and
small, the breathing hot and laborious, with
great Oppression on the *Præcordia*, the Urine
sometimes crude and pale, sometimes high-color-
= ed and turbid, but without sediment; a
generally Delirium generally came on soon.
The sick commonly bore Bleeding at the beginning

with advantage, and the Blood was after this
much less in general than in Quinries of
the truly inflammatory kind - they very
seldom however admitted of large Bleeding,
scarcely indeed of a second. - In all sorts of
fevers there was a surprising Disposition to Eruptions
of some kind or other, to Sweats, soreness of
Throat and Aphthae. -

He then proceeds to give an account of the
Malignant Ulcerous sore throat as it appeared
in 1752.

The attack of this Disease was very different
in different persons. - Sometimes a Rigor, with
some fulness and soreness of the Throat - and
painful stiffness of the Neck, were the first
Symptoms complained of - sometimes alternate
Chills, and Heats, with some degree of Head-ach,
Giddiness or Drowsiness, ushered in the Disorder

in the animal system.

it seized others with much more feverish
Symptoms great pain of the head, Back,
and Limbs, a vast oppression of the Praecordia
and continual sighing. - Some grown persons
on the contrary, moved about for a day, or
two neither sick or well, as it were, but
under uneasiness and anxiety till they
were obliged to lie for it - But it commonly
began with Chills and Heats, Load and Pain
of the Head, Soreness of Throat and Hoarseness,
some Cough, Sickness at Stomach, frequent
Vomiting and Purging, in Children especially,
which were sometimes very severe; though
a contrary State was more common
to the adult. - There was in all a very great
Dejection of Spirits, very sudden weakness, great
heaviness on the Breast and faintness from
the Beginning. - The Pulse in general was quick

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small and fluttering, though sometimes heavy
and undesc.— The Urine commonly pale,
thin, and crude, however in many grown
Persons in small quantities, and high Colored,
or like turbid Whey.— The Eyes were heavy,
redish, and as it were weeping.— The
Countenance very often full, flushed and
bloated, tho sometimes pale and sunk.

at Night the Symptoms became greatly
aggravated, and the febrile Habit very
much increased, nay, sometimes ~~as~~ a Delirium
came on the very first Night;— and this
Exacerbation constantly returned in the
Evening through the whole Course of the
Disease.— Some few Hours after the seizure
and sometimes cotemporary with it, a

in the animal system.

Swelling and Lumps of the Throat was
perceived, and the Tonsils became very tender
and inflamed, and many times the parotid
and maxillary Glands swelled very much
and very suddenly, even at the very beginning,
sometimes so much so as to even threaten
Strangulation. The Fauces also very soon
appeared of a high florid red or rather
of a bright Crimson colour, very
shining and Glossy; and most commonly
on the Uvula, Tonsils, Velum Pala-
-tinum, and back part of the Pharynx
General whitish, or Ash-coloured spots
appeared scattered up and down - which
sometimes increased very fast, and soon
covered one, or both the Tonsils, Uvula &c.

These in event proved the Sloughs of superficial
Ulcers (which sometimes however eat very
deep in the parts) The Tongue at this time
tho' only white and moist at the top was
very foul at the Root and covered with a
thick yellowish, or brown Coat - The Breasts
now became very tender - The 2 or 3 Day
every Symptom became more aggravated
and the fever more considerable - The
Restlessness and Anxiety increased as well
as the Difficulty in Swallowing - The
Head was very giddy, pained and loaded
and generally more or less Dilatation
sometimes a Vomiting & Diarrhea was
urgent especially in Children - The Sloughs
were now much enlarged and of a dark

Color and the surrounding parts tended
much more to a livid hue - The Breathing
became more difficult with a kind of
Tatling Hysteria express^d the Noise such
make as are struggling with a Rope - and
the shrill barking Noise as in infant
Quinsey. The Nostils become in some
inflamed and excoriated and great
discharges took place - which being sometimes
swallowed occasioned excoriation of
the intestines Violent Gasping, Dyspnoea
&c - The windpipe was sometimes excoriated
and some of its internal membrane coughed
up - sometimes the Angina came on
before the Exanthemata, but many times
the Cuticular Eruption appeared before the sore throat

The Effluence commonly appeared about
the 2^d, 3^d or 4th Day - sometimes Erisipelas
sometimes pruritus - An early Eruption
was commonly a good omen when attended
with a Desquamation of the Cuticle.

but when the Eruption turned of a livid
hue the utmost Danger impended -

The Disease was generally at its height
about the 5th or 6th Day - and the Crisis
many times was not till the 11th or 12th.

If a gentle easy sweat came on the 3^d or 4th
Day, if the Pulse became more flow
firm and equal, if the thoughts cast off
kindly and appeared at the Bottom
tolerably clear and fixed - if the breathing

was soft and free and some degree of Vigor
and Emotion returned to the Eyes, all
was well. and a salutary Crisis soon
followed - but if a Riga came on
and the Exanthemata suddenly disappeared
or turned livid - bad sign - It was necessary
to pay particular attention to Symptoms
in order to decide as to the propriety of
Bleeding, purging &c - When the pulse
was small, quick, and equal fluttering
Pulse at the attack of this Malignant
Fever, tho' indeed it sometimes was
full and undeviating but even then heavy
and unequal - to the extraordinary degree
of Spasms and Shivering - Profuse Anxiety

Lighting and great oppression on the Procardia
heavy, dull, watery and as it were
weeping Eye, pale nose, thin Urine
the often turned like Whey - to the
whitish least commonly reddest Tongue
the considerably furrowed near the Root -
to the shining crimson Color of the
fauces, with interspersed white, or
ash Colored Spots or Blotches, with
a nauseous and sometimes very
foetid Breath - To the scarlet or
crimson Efflorescence (in some myo-
elations in other pustular) on the Arms
Arms, Neck, Breast &c. - Symptoms
that attended this Disease - He allows
that some Bleeding may be proper

at the very beginning of this Disease
in some plethoric adult Persons, some
Blood may be drawn at the very beginning
of this Disease, but a repetition was
generally injurious

Cure

Instead of bleeding I generally begin
^{or rather order} with a Clyster of Milk, Sugar and
Salt to be injected to unload the
intestines, especially if the Patient was
Costive; but when a Purging attends
the Attack, a few Grains of torrefied
Rhubarb with Spec^s Scordio, Decoct.
Ab. &c are proper. And if a Diarrhea
is profuse, a Spoonful or two of Decoct.
Tracastorni Fulleni may be frequently

given which is in such Cases, a
 very efficacious Medicine. — If Nausea
 & Vomiting were urgent, I ordered a
 gentle Emetic particularly Adults —
 & Children with a little Oxy-mel
 Scillit. Esp. of Antimony — in order to
 remove the vast Mass of tenacious mucus.
 I then immediately put the Patient on
 a saline Mixture of Salt of Wormwood
 or Vol. Sal. C. C. and Juice of Lemon
 with Aq. Alexet. simpl. to which was
 added a small Quantity of Myrrh and
 Saffron; or these last were given in
 a bolus with a few grains of Nitre
 if the fever ran pretty high — the addition

also of a grain or two of Camphor was
very useful for the Adult when the
Stomach would bear it; when it
would not, I used Julep e Camph
or acutum Camphoratum with Syrup
of black Currants, Raspberries or the like.
The second or third Day to the saline
mixture, or a temperate Cordial Julep,
I added some of my Fruit. cut. P.
Alexipharmac: which, at this time of
the Disease, I found greatly prefer-
=able to the Bark in substance
as it much more tends to promote
the Eruption of the Exanthematous,
and does not by far so much hinder

the coming on of Sweats, which at all
times of this Distemper are of the high-
=est service, provided they are gentle,
Uniform, and Universal - Indeed
it was with great difficulty the
Sick could be brought to sweat
at all, but whenever moderate, equal
diffused sweats came on the 3rd, 4th or
5th Day, or even later, they were critical
and salutary, the Urine grew
immediately more concocted and
further deponed a very large Quan-
=tity of Clay colored or pale latentine
Sediment the before Crude, thin, or
limpid - I commonly gave Elixir
Vituli with the Infusio of the Bark

except to very young children which
is an excellent Anti-putrescent
Alexipharmac and I frequently
order the Elixir to be taken out
of an Infusion of a Rasted Seville
- Orange in Claret, or Red Port Wine
and Water - which is a very pleasant
and not an ineffectual Composition.

The Gargle I commonly used was
a Decoct. of Tyme, Red Rose leaves,
Myrrh & Honey in Tough Cider,
and a thin Mucilage of Juniper seeds
with Syrup of Marshmallies, or black Curr-
=rants; and a little Tincture of Myrrh,
per se, and Spirit of Vitriol, was to be
taken by Spoonfuls every now and then
especially after Gargling.

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and I also directed the Tumes of Red
Rose leaves, Chamomile flowers,
Myrrh and Camphire boiled in Vinegar
to be drawn in with the Breath very
Often, as hot the Patient could well
bear it, which gave our great and
speedy Relief. —

Tho the swelling of the Neck, parotis
Glands &c. would sometimes
come on so sudden, great and
Violent, as to endanger a Suffocation,
Yt in general I took this external
Tumor to be partly critical and therefore
endeavored to promote it by Acid Cataplasms
Blisters &c. nay I have several times
blistered the Throat from Ear to Ear
with great Success. —

in the animal system.

These Applications are useful in common
Iunreys; much more so in this
when the Humors were so exceeding
Sharp and Malignant. Indeed if

If the Abdomen was very tense, and
the Patient costive, about the 5th
or 6th Day I generally gave a Dose
of Rhubarb Manna or lenitive
Electuary - and after that commonly
the Bark in substance - but I never
so ordered it when the Belly was very
tense and constipated, nor until
some signs of coction or a beginning
desquamation of the cuticle appeared.
For I found my Fructus, or a decoction
of the Bark, answerable as well, nay

better, as causing much less Oppression
on the Breast. - I now also used a
Kind of Resin of the Bark, made
with Spirit of Wine, which I much
prefer to the Common Extract, as it
sits much lighter on the Stomach,
and keeps much better; and therefore
I think it more proper for an Official
Medicine. However improper Purgings
might be at the beginning of this Distemper
gentle easy Cathartics as Rhubarb
Manna &c were necessary at the
end to carry off the putrid Colours
of the intestines, which otherwise
protracted the feverish heats and
occasioned great Weakness, Want of
Appetite, turned Bellies, and great

in the animal system.

Obstructions of the Glands; nay I was
often obliged to give Repeated Doses
of Calomel to carry off the Swelling
of the Parotid and Maxillary Glands
which otherwise frequently remained
a long time much swollen and indurated
and at length sometimes suppurated.

Indeed I found it necessary several
times to rub them with a Mercurial
Oyument before I could dissolve
the Swimmors. Many however required
frequent Purgings, a Continuance of
the Bark & Other's Mineral &c for
a considerable time, and then a course
of Open Milk and an Open Country
Air.

The Word Fever, as promiscuously used in the Practice of Physic, is not a little Vague and undetermined. — There are some Disorders that pass under that general Name, which are best cured even by raising the fever, to instance only in some Quartan Agues and low nervous Fevers. — And the Malignant Quinsey here described, is another Species of fever, which evidently proves that all acute Diseases are not to be treated merely with Evacuations, and cooling Medicines. — Proper dilution is unquestionably useful in all fevers but certainly some

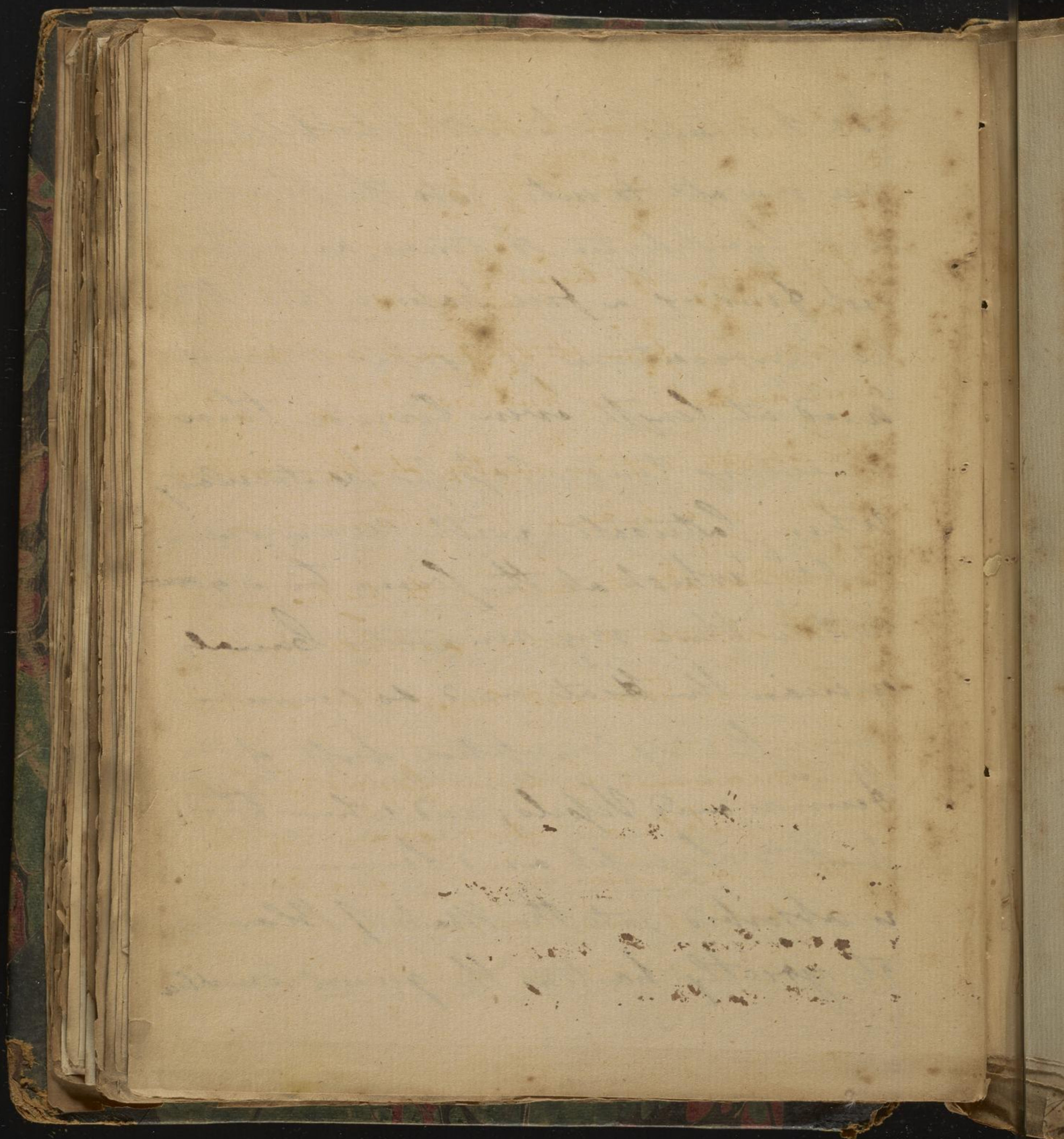
Require more than Bonley Water and
Lemonade.

I shall add a word or two on the
use of Vol. alk salts in fevers of
the pestilential or putrid kind
in which I fear they are too often
very improperly administered.

In all fevers of this nature the
Blood is always found too much
broken and dissolved, and at length
becomes highly acrimonious
and as it were formidous and putrid
Whatever tends to promote this
acrimony and Depolution as
inquiry and the Vol. alk salts
do this in an eminent Degree.

Broken and Dissolved Globules
are very apt to enter into the Serous
and Lymphatic Arteries, and there
not finding a free passage thro' their
complications stagnate & corrupt
and at length even corrode these
exceeding tender Vessels - particularly
when saturated with acrimonious
Jults - which at the same time greatly
irritate these very minute Canals
encrease the Heat, and so cause a
more speedy corruption both of the
Humors and Vessels; and when the
putrid Lymph and Serum and
is absorbed into the Mass of Blood
it greatly hastens the general corruption

in the animal system.



(1)

Taken from Chisholm
^{Success}
and Fevers -

Indications of use

1. To discharge from the stomach and intestines acid and offensive humors.
2. To obviate inflammatory diathesis without producing a tendency to putrescence. -
3. To modulate the tendency to putrescence and to obviate it when actually present.
4. To restore Tone and Energy to the system.

1st Ind. answered by taking One and a half ounces of Salt and Two grains of the tartarised antimony dissolved in a pound and a half of pure cold water a large wine glass full was given to the patient

In the animal system.

every hour until a sufficient effect was
produced or till the whole of the quantity
was taken. The two first wine glassfulls
generally operated as an Emetic and fully
evacuated the Stomach, the medicine after
this acted on the intestines and excited
a copious discharge of their contents -

If at the same time a diaphoresis
broke out / and it almost always did /
the Patient found himself considerably
relieved - I have sometimes known during
the consequences of copious evacuation by
Stool contented myself with an Emetic alone
composed of from ten to thirty grains
of Ipecac: and one or two of tartarised
Antimony - The sometimes used the bitter
pungent Salts and found the addition of

Lime juice and Sugar rendered the Solution
much more agreeable -

2 Indica: fulfilled by giving doses of Nitro
Camph: and Tart. Emet: with occasionally
Small doses of Laudum to produce
diaphoresis - sometimes used the Saline
Draughts of Rivierius with the same intention
persuasion in the above plan sometimes and
the slighter cases - the skin being covered
with ^{an agreeable} Moxture he commenced the exhibition
of the Bark to prevent tendency to pu-
-rescence also warm and nourishing food.
Finding however all the antiphlogistics totally
ineffectual and that Bleeding was on no account
admissible I had recourse to the only Remedy
left me, Mercury. he exhibited the Mercury
in ^a pills generally composed of five grains
Calomel two grains of the Antimonial powder

In the animal system.

and one of Opium - and repeated four times
in twelve hours or eight times in the twenty
four hours. If Salivation was ^{speedily} raised the
danger was removed and the Patient recovered
In several instances he pushed the mercury
to an almost incredible length with aston-
-ishing success - in one instance signs of
recovery did not appear till the 21st day
fully 400 grains were given before the
salivary glands were affected, - in
order to effect a Salivation it was frequently
necessary to increase the quantity and number
of Doses - In every case wherein Salivation
took place, little further was required than
the plentiful use of nourishing ~~food~~ simple
food and wines - But when the mercury had
not this effect or when its action was so tardy
as to give room for the most serious apprehensions
of the event it was necessary to have recourse

to the Bark. In instability or sickness of the
Stomach Ether was the only Medicine that
was in any degree truly and permanently
beneficial in enabling the Stomach to
Receive and Retain the Perm. Bark.
Many Cases fully convinced this, and a few
occurred in my practice, wherein the cure
was completed by this Medicine alone. —

I gave the Ether in the following manner
the Patient being allowed to remain undisturbed
about an hour, I gave him about a tea-spoon
full in about half a wine glass full of cool
Water. — after this he continued undisturbed about
two hours when the dose was repeated —
at the expiration of another hour, the Bark was
offered him; and if he swallowed and retained
it, the Ether afterwards was given only once
in five or six hours. — But as this very seldom
happened, it was generally necessary to repeat
the Ether in the same quantity every three

In the animal system.

hours till the Spasm of the Stomach was
entirely overcome. Ether given in this manner
I have mentioned is extremely grateful it
occasions an agreeable warmth along the
Oesophagus, and gently stimulates the
Stomach - This Effect however does not
continue long; but the frequent production
of it at length gives it permanency - it
appears to act as a tonic, an antiseptic, and
an agreeable stimulant - a warm glow overspreading
the Surface, and thus, Nausea and oppression
often have fled before it - I have generally
during the exhibition of the Ether and till
the Stomach became Retentive ordered Bark
to be administered in the form of injections
which were exhibited in the following
manner I generally added two tea-spoons
ful of a strong watery Solution of Opium
to an injection composed of an ounce and a
half of the Bark and eight or ten ounces
of water moderately warm^d by Chicken Broth

on Beef tea - the injection was repeated
day and night every three hours; and
if uniformly retained a laxative injection
was administered in the 2^d hour to carry
off the accumulated Bile - with a view
to overcome the Spasm by distention I had
a pint and a half of the above mixture
injected into the anus ^{and} with some degree
of violence ~~order~~ applied a compress to the
anus by means of a towel well rolled
up the instant the pipe of the Syringe was
withdrawn - Singultus is most effectually
relieved by holding a quantity of Cold
water in the Oesophagus for a minute or
thirty seconds - To two ounces of Bark
he added as much Port wine as rendered
the mixture sufficiently thin ^{to pass thro' the Syringe pipe} and with the
usual allowance of Solution of Gum and
administered every three hours

In the animal system.

He used the Angustura Bark. I gave
[he says] a *Si* of Angust. Bark mixed
with water every hour, or *Si* in three
hours - To restore Tone in Convalescence
Change of apartments Exercise -
use of generous wine &c -

In a case of incipient Pthiris. R. gave the
following directions viz. To be bled to the
quantity of 8 ounces once a week - to take
from 20 to 40 drops of Laudum Night
and morning - And to take of the Elis:
Vit: three times a day - morning, noon and
night in the quantity of from 30 to 40 drops -
to live upon light nutritious diet - as
Rice milk. Roasted Potatoes - Roasted Apples
Eggs soft boiled &c - The Patient was a very
pale Constitution and recovered.

Directions for the Cure of incipient Pthirus

It will be proper to lose eight or ten ounces of blood immediately and to repeat the loss of the same quantity once a week untill your cough is relieved. If not relieved by a second Bleeding, apply a blister to your Side or Breast as near as possible to the Spot where you occasionally feel any pains.

Take at the same time twenty or thirty drops of the Elixir of Vitriol three times a day in tea of any kind and drink freely of flaxseed tea, or Barley water made pleasant by the addition of a little Sugar and lime juice, or if lime juice cannot be conveniently had, a

In the animal system.

little Vinegar.

Live during the use of the above Remedies upon mild Vegetables for food with a little milk. Rice boiled in equal parts of Milk & Water. Roasted Apples, baked Pears. Apple dumplings made with rice or a paste composed of equal parts of wheat flour and boiled potatoes, Roasted Potatoes. Roasted or boiled Onions, weak Tea & Coffee. Weak Chocolate, with now and then a few half Roasted Oysters, fresh boiled fish, a soft boiled egg, a little weak chicken broth, - the wing, or breast of a boiled chicken. - a little salted meat or salted fish will be the articles of diet most proper. Mix them as little as possible in your stomach, and eat a small quantity of them at a time so as to make five or six small meals instead

of two or three in a day - a little weak porter and water may be taken with them.

Take from 15 to 45 drops of Laudanum every evening about 7 o'clock in order to compose you to the cough at night, and take from 10 to 20 every morning as soon as you wake in order to compose your cough during the day time.

Wear flannel next to your skin in cool and cold weather. - Protect your feet with great care from the cold. Eat, drink, sit constantly, and sleep in a stove room in which great pains should be taken to preserve a moderate and uniform temperature of air both day and night. -

Avoid going out of your house before 8 or 9 o'clock in the morning, and after 5 or 6 o'clock in the afternoon - also in damp and very cold weather. Avoid loud and long speaking Reading and singing. Also fatigue from all its causes both of body and mind. Use gentle exercise in dry and moderate weather. - Should the above remedies fail of greatly relieving you in the course of two or three weeks, have

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remain established and permanent
in the animal system.

Resort to a gentle Salivation which to be effectual should be kept up two or three weeks.

After the Salivation is over take for one month and alternately each of the following Medicines.

1. From 5 to 10 grains of Iodine made into pills with flour, three times a day.

2. A teaspoonful or two of a half pint of old Brandy or Spirit of any kind in which an ounce of bruised garlic has been infused.

Loose a few ounces of blood at any time, for months or perhaps Years to come, whenever your Cough is unusually troublesome or when you feel an unusual pain or oppression in your breast, or where your pulse is unusually full or tense.

Keep the Bowels gently open by any kind of gentle physic.

Of Pathology,

Path

Pathology is that part of Medicine which treats of the various morbid states of the human body; - or, it delivers the general doctrine of Diseases. —

Every affection of the human body, which produces changes, or appearances, different from a state of health, may be called a disease, or a Morbid state. —

— Diseases in general.

In the general doctrine of diseases, four things are necessary to be considered, 1st The disease itself, 2^d The causes of Diseases, 3^d The symptoms of Diseases, and 4th The differences of diseases.

First then, — a Disease is a physical effect arising from a determinate cause, operating by certain established and permanent laws in the animal system.

Second, The cause of a disease is whatever pro-
duces ^{such a change} in the body as constitutes the Disease.

And that part of Pathology which treats of
the causes of Diseases is called Ätiology.

The causes of diseases are either proximate
or remote. — The proximate cause, is that
w^h immediately constitutes the disease;
therefore sometimes called the material, or
exciting cause of the Disease. —

The Remote causes are twofold; Progen-
ital, or Predisposing, and, Precipitating
or Occasional; these are sometimes called
antecedent causes. —

— Thirdly, that part of Pathology which
treats of the symptoms of Diseases, is called
Semiotics. — The symptoms of Disease
are either essential, or accidental. — The
Essential Symptoms, called also Pathognomonic

Symptoms are those constant symptoms in a Disease which designate its nature. Thus a Cough, acute fever, pungent pain of the side, and laborious breathing are Essential Symptoms of a Pleurisy. — Accidental Symptoms are such as may be either present or absent, without altering the nature of the Disease, as vomiting and diarrhoea in a pleurisy. — Symptoms are either constant and permanent, continuing thro' the whole course of the Disease, as a fever in a pleurisy, or, they are supervening or epigenominal happening at different periods of the disease, as the eruption of pustules &c. in the Small Pox. —

The Symptoms of Diseases are also Diagnostic, Prognostic, & Anamnestic, —
Diagnostic, when they point out a Disease present; Prognostic, when they predict the future consequences of a Disease.

Anamnestic, when they indicate a pre-
ceding disease, as pitting after the Small-
pox. — . The progress of a Disease is generally
marked by Stages, as the beginning, increase
height or Acme, and Decrease. — .

Fourthly and lastly. The difference
observable in diseases are of various kinds.
Diseases that run very quickly through their
several stages are called Acute or short;
those that run slowly through them, are
called chronic, long, or slow diseases. —

Some Diseases are universal, affecting
the whole system, — others are topical
affecting only a particular part. —

Some diseases are continuous, some emit-
ting, and others Intermitting. —

Remitting and Intermitting diseases
are called periodical, — they are either regular or irregular.

The Order of return of periodical diseases, is called its Type. — The Return is called the Paroxysm, or accesion; — The Interval, Apyrexia, Intermission, or Remission, —

Diseases are either original and Idiopathic, or they are secondary and Sympathetic.

Diseases are called either vernal or Autumnal with respect to the season of the Year —

They are likewise Sporadic, or Epidemic, Pandemic. — Pandemic diseases are either Epidemic or Endemic. —

— Of the particular morbid affections.

These are best treated of in the order of Dr Cullen's Physic. — as follows —

1. Of the diseases of the simple solids.

2. Of the diseases of the living solid.

3. Of the diseases of the Vital Organs, and in the motion of the fluids —

- 4th Of the Diseases of the Natural function, and
of the fluids themselves. — }
5th Of the Diseases of the Organs of Sense.
6th Of the Diseases of Organs of Motion, &
7th Of the Diseases of Functions peculiar to 7 sens.

1st Simple Solids,

Debility. — Rigidity. — Gracility. —

2^d Living Solids.

Irregularity. — Torpor. — Energy. Atonia.

Vessels. Dilatation. — Obstruction. Rupture. — Aneurysm. — Varix. — Hemorrhage. —

Organs. Inflammation. Solution. Fracture. Aberration. —

3^d Vital Organs &c.

1st Lungs. Lused Respiration. Cough. Stermulation. Yawning. Pandiculation.

2^d Heart. Palpitation. Syncope. —

3^d Motion of the fluids. Excess. Defect. Irregular. —

4th Natural Functions & fluids.

Anorexia. Dyspepsia. Bulimia. Vomiting.

Cholera. Diarrhoea. Constipation. — Diabetes.

Strangury. Dysuria. Ichuria. — Epiduria.

Aphoresis. —

Of the Fluids, In y^e Uterus. Coenochylia. —

In the Blood. Quantity — 2^d quality. Plethora.

Obesity. Inanition. Leanness. — Lentor.

Tenuity. Acrimony. Vitiations of the Chyle,

blood, secreted fluids and Excretions —

Damnandum est huic — inter alios.

Damnandum

Damnandum est huic — inter alios.

Damnandum est huic

Damnandum

Damnandum est huic

Damnandum est huic

Damnandum est huic

Damnandum est huic —

Damnandum est huic
inter alios —

Damnandum est huic
inter alios —

Allegation

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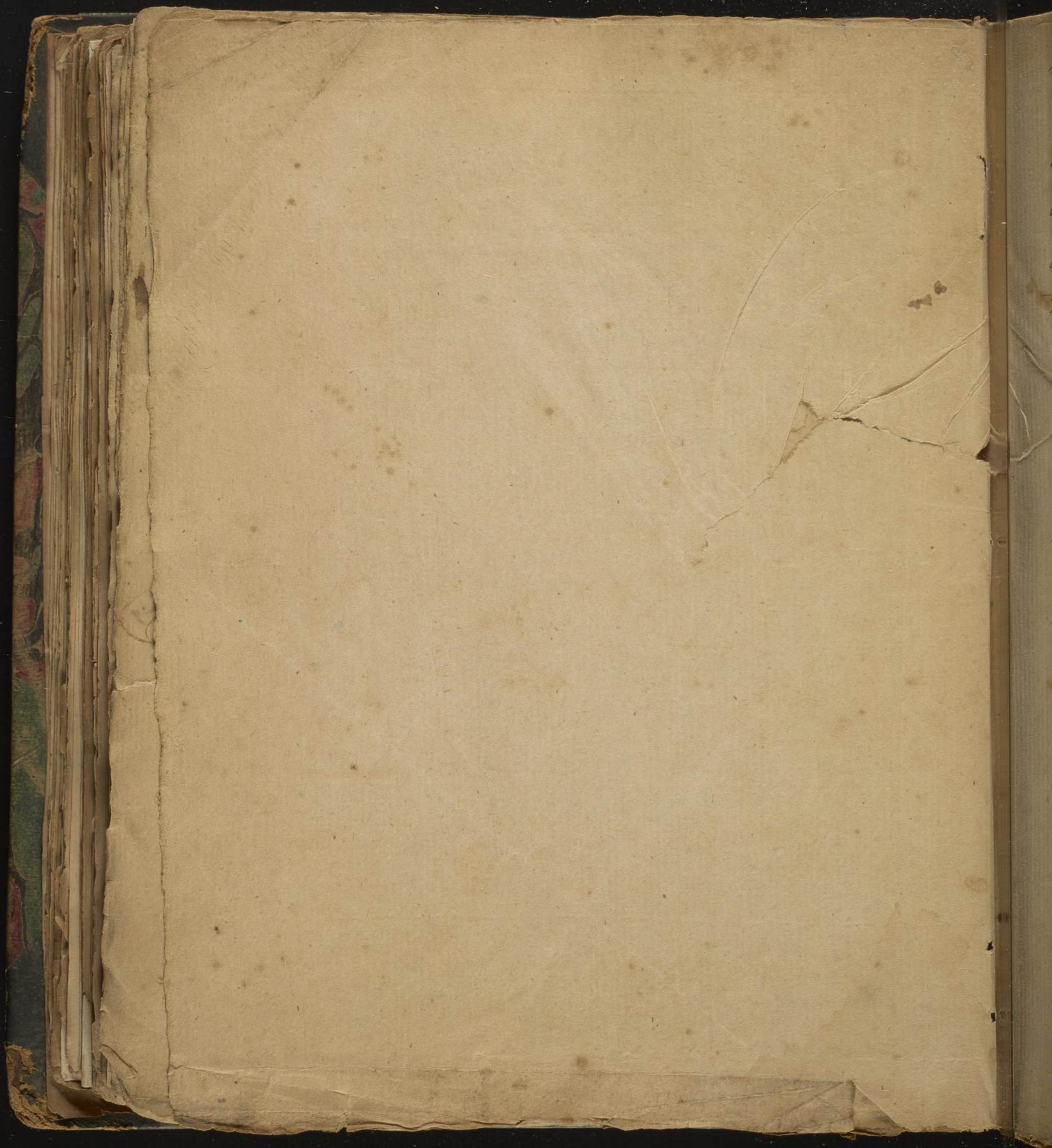
Gen^l

Accordingly to the Rules of this Society, I shall introduce the business of the Day, with a few observations, on the chemical principles of bodies. —

By Chemical principles of bodies, I mean those elementary particles of matter, which constitute the Basis of all the objects of Chemistry; or those component parts into which all bodies, by chemical analysis, may be ultimately decomposed; and by various combination of which, all the changes and alterations of bodies, produced by Chemistry, are effected. —

These principles have been variously enumerated, according to the different hypotheses of chemical writers, and the degrees of improvement, that from time to time have been made in this branch of knowledge. —

For Chemistry, tho' a very useful and important branch of Natural Philosophy, received but little improvement, until very lately. It is scarce half a century, since it first began to take a Scientific form, or since any attempts were made, —

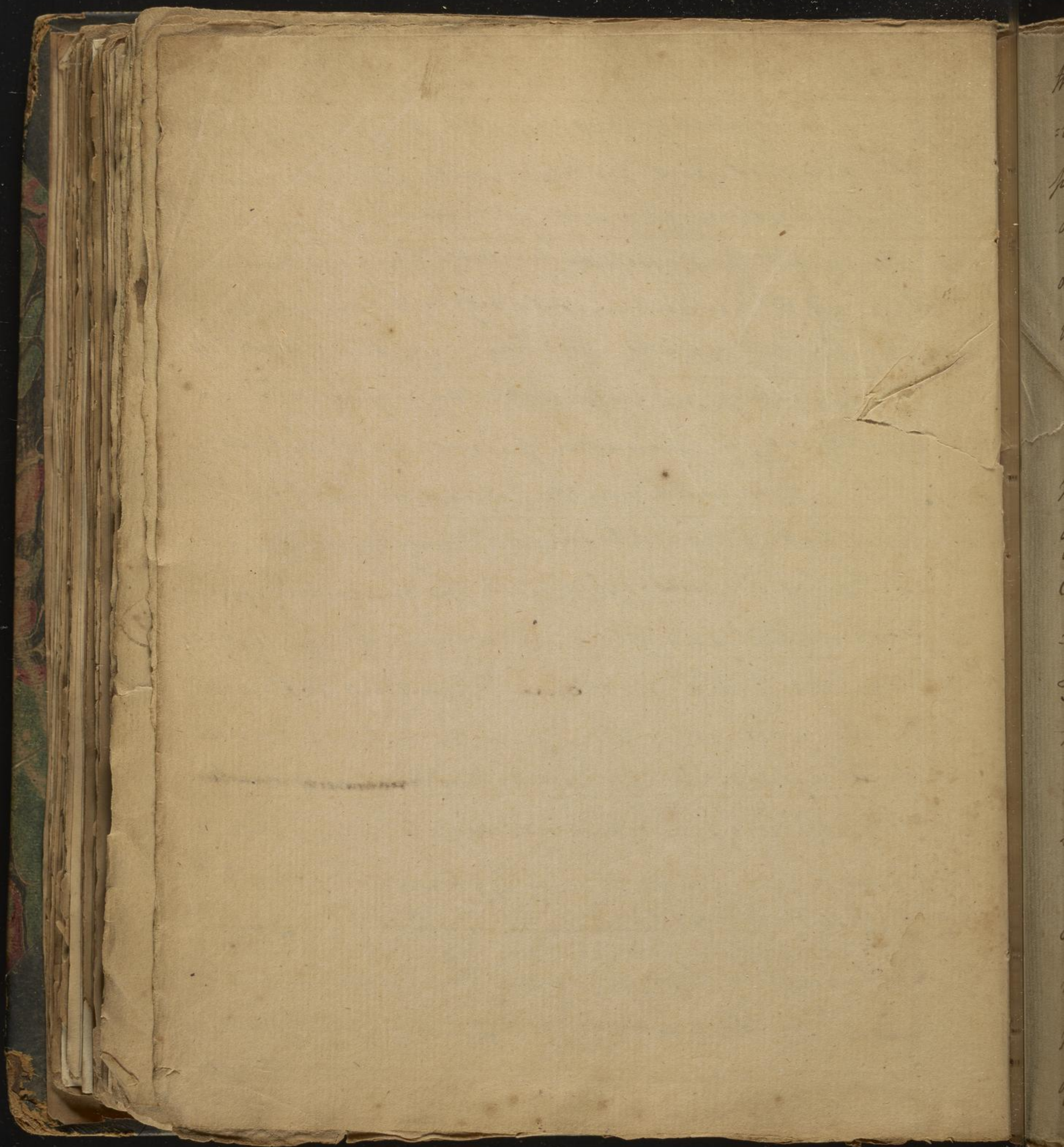


made to reduce it to a regular System.

But, since it has assumed its rank in the circle of Sciences, and has been cultivated as a branch of natural and medical knowledge, greater discoveries, and improvements have been made therein, than in almost any other Science.

The Ancients who had very little knowledge of Chemistry, entertained very imperfect Ideas concerning the chemical principles of bodies.

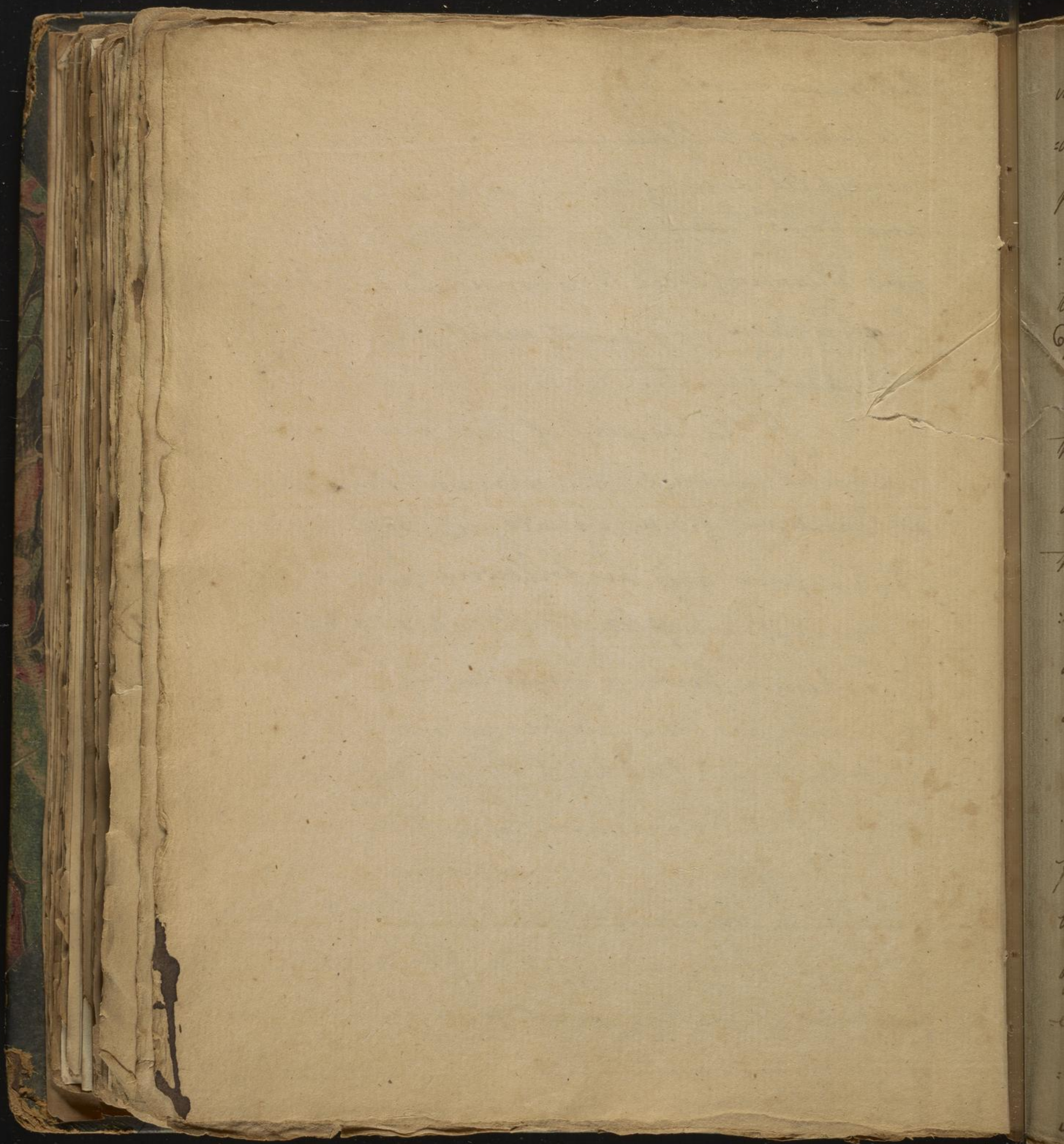
The most ancient opinion that hath been handed down to us, with any degree of certainty is that of Hermes Trismegistus, the famous Egyptian Philosopher and Chemist, who lived above 3000 years ago, and from whom Chemistry hath sometimes been called the Hermetic Art, and Hermetic Philosophy. According to this ~~Doctrine~~ ~~Philosophy~~ Philosophy, (which however, it is probable, is of much later date, than the Egyptian Hermes), there are but three chemical principles in all bodies, Salt, Sulphur, and Mercury; that metallic substances, and all other bodies of a similar nature, are composed of a Mercurial principle, united with Sulphur.



that solid bodies, have a saline Basis, and Inflamma-
-ble bodies, a sulphurous one. To these supposed
principles, were afterwards added, two others, Earth,
and Water, and then, Earth, Water, Salt, Sulphur,
and Mercury, were long considered by the Elemental
Philosophers, as the component principles of all
chemical objects.

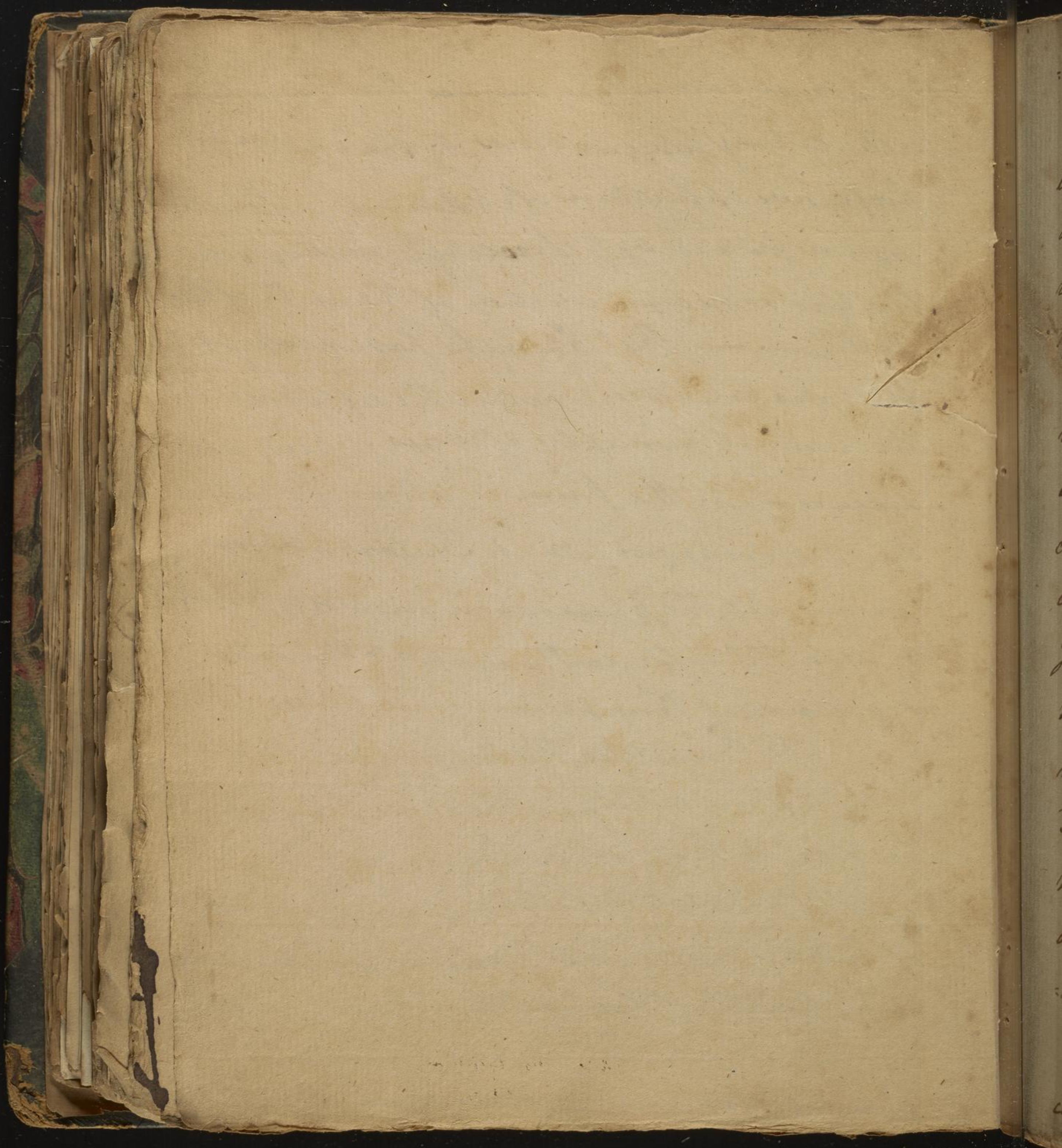
Of the variety of sects and opinions, that
prevailed amongst the ancient Philosophers
of Greece and Rome, I shall only observe, that
Anaxagoras and his followers, supposed the ele-
-mentary principles of all bodies, to be Fire, —
This opinion, however improbable it may appear
to many, has been revived in modern times, and,
under different technical forms, has met with a
number of patrons and supporters. —

The School of Democritus gave rise to the
Atomic, or Corpuscular Doctrine, which supposes
the elementary principle of bodies, to be certain
portules of matter, which from their various modes
of aggregation, constitute all the varieties observable
in, 84



in natural bodies. — The changes, that are continually taking place in bodies, by the regular and progressive operations of Nature, and the alterations produced by the effects of Chemistry, seem to afford some demonstration of the truth of this Doctrine. — But Chemists have never yet been able to discover, whether the differences in the chemical principles of bodies, depend on a difference in the primary atoms of which they are composed (which Philosophers commonly call the physical principles of bodies), or upon the different arrangements, or modes of aggregation, of those primary particles. —

The Peripatetic Philosophy, which universally prevailed, from the days of Aristotle its founder, to those of Bacon, afforded no light to Chemistry. — The imaginary doctrines of Entities, and occult qualities, which pervaded every part of that quibbling System, were altogether incompatible with the mode of investigating the principles of bodies, by che-
mi.



Chemical Enchiridion. —

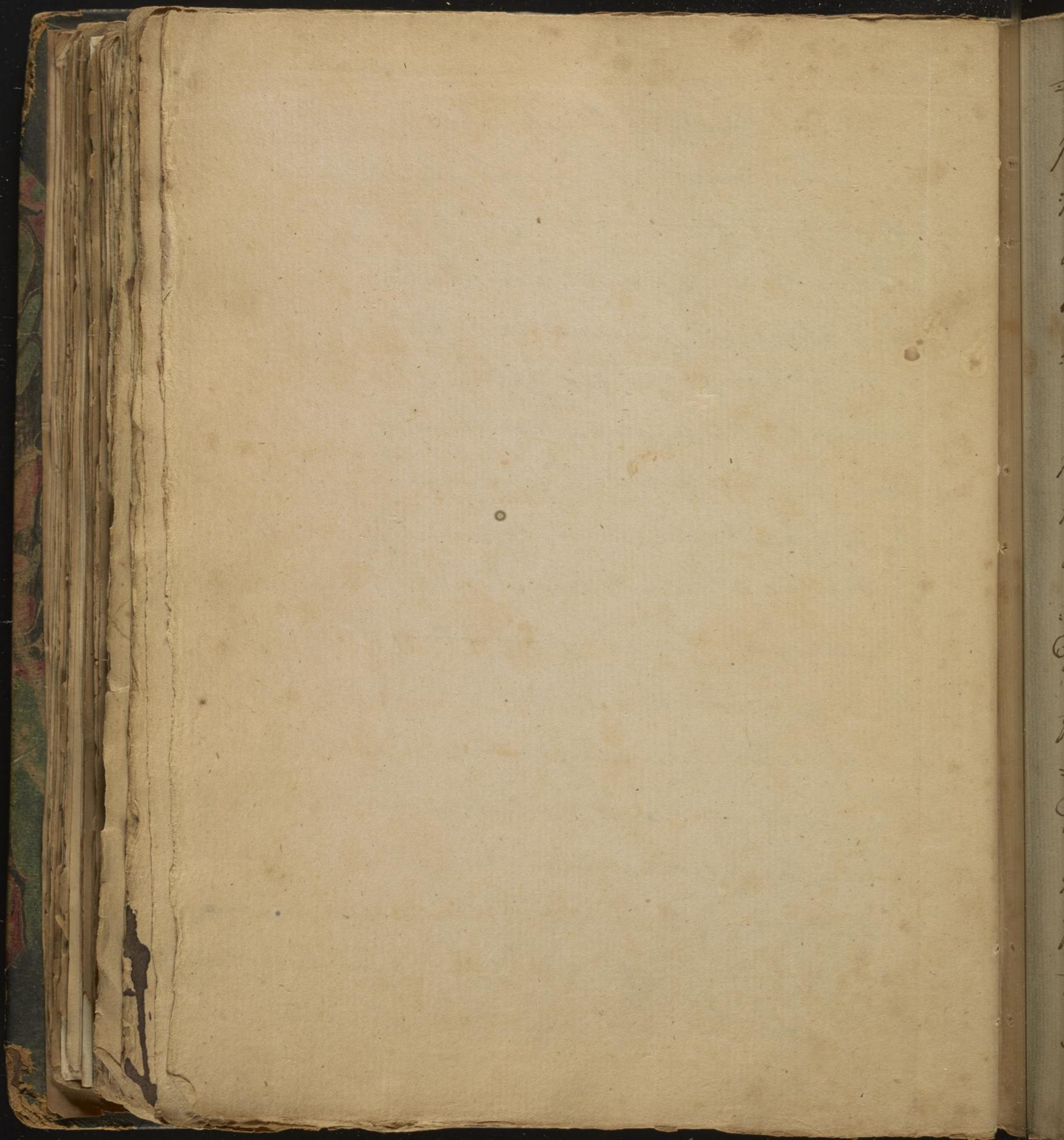
The Arabian Physicians were the first, who have given us any particular account of the operations of Chemistry. — They reckon their Alkahest, and Alcohol amongst the chemical principles of bodies. —

For many Ages before and after the revival of literature in Europe, Chemists were generally employed, in the fruitless, and chimerical endeavours, to discover, what they called the Philosophers Stone, an universal Solvent, and the transmutation of metals. —

Paracelsus and Van Helmont are amongst the most noted and whimsical of this class. —

The Axioms of the former, and the Axioms of the latter, comprehend the chemical, general, and universal principles of all bodies, according to the Alchemistic Language of those times, i.e.,

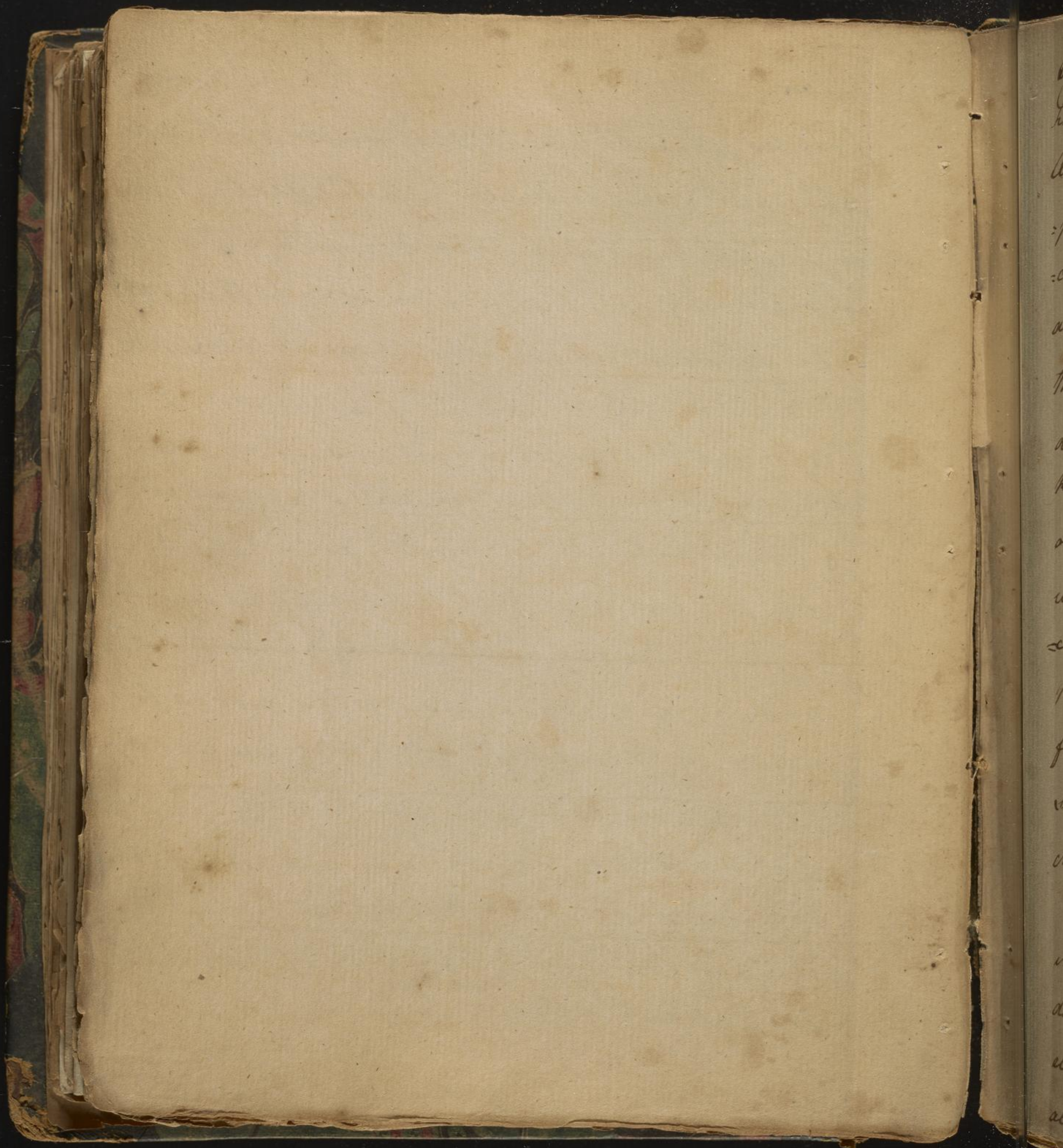
In the last Century, Des Cartes, by combining the chemical Doctrine of Ferment-



tation, into the principles of the mechanic powers, formed an ideal System of Philosophy; but being entirely hypothetical, it was of too short duration to have much influence in Chemistry, as it soon gave way to the Newtonian System, which hath prevailed ever since.

Sir Robert Boyle was the first person, who performed chemical operations upon true philosophical principles. — His Experiments on the divisibility of matter, and on the ponderosity of light and heat, revived the ancient Doctrine of the corpuscularians, and laid the foundation for usefull discoveries, and improvements in Chemistry. — He was succeeded by Dr. Boerhaave, who supposed that the sensible qualities of bodies, depend upon a certain subtle fluid, which he calls Spiritus Rector; and that the chemical principles of all bodies, are, Fire, Air, Earth, and Water, —

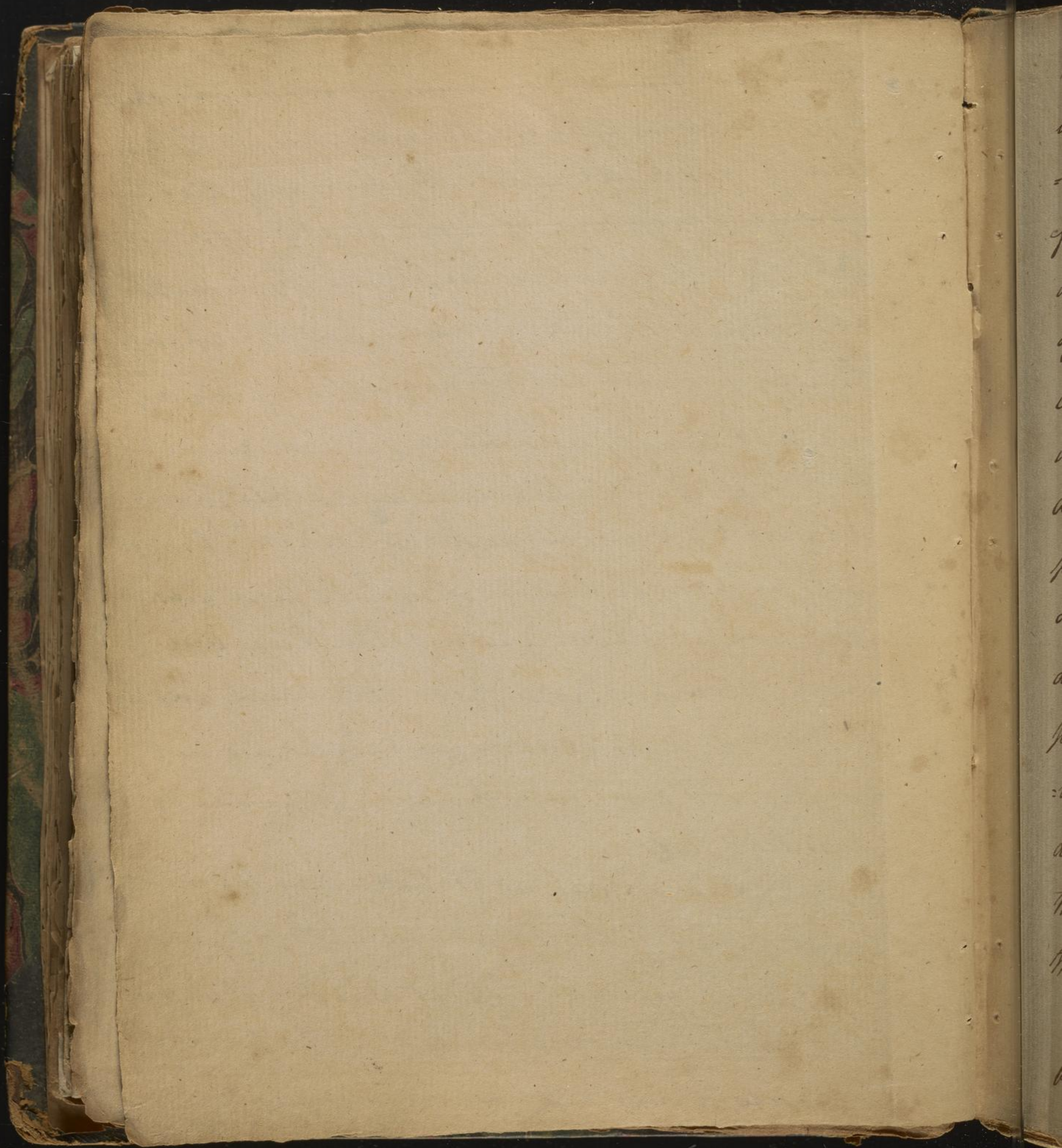
But the discovery of the affinity of



bodies, or the Laws of chemical attraction, which happened soon after Boerhaave's time, is the true Era of Chemical Science. By means of this important discovery, the effects and consequences of every operation in Chemistry, brought about by heat and mixture, and the changes thereby produced in the properties of bodies, are now clearly understood, and a more accurate knowledge of the chemical principles of bodies, obtained. — In consequence of which, it is now well known, that most, if not all those substances above mentioned, which the Peripatetic Philosophers, and after them Boerhaave and his followers, call elementary principles, are not simple, but compound bodies, decomposable by chemical Art. —

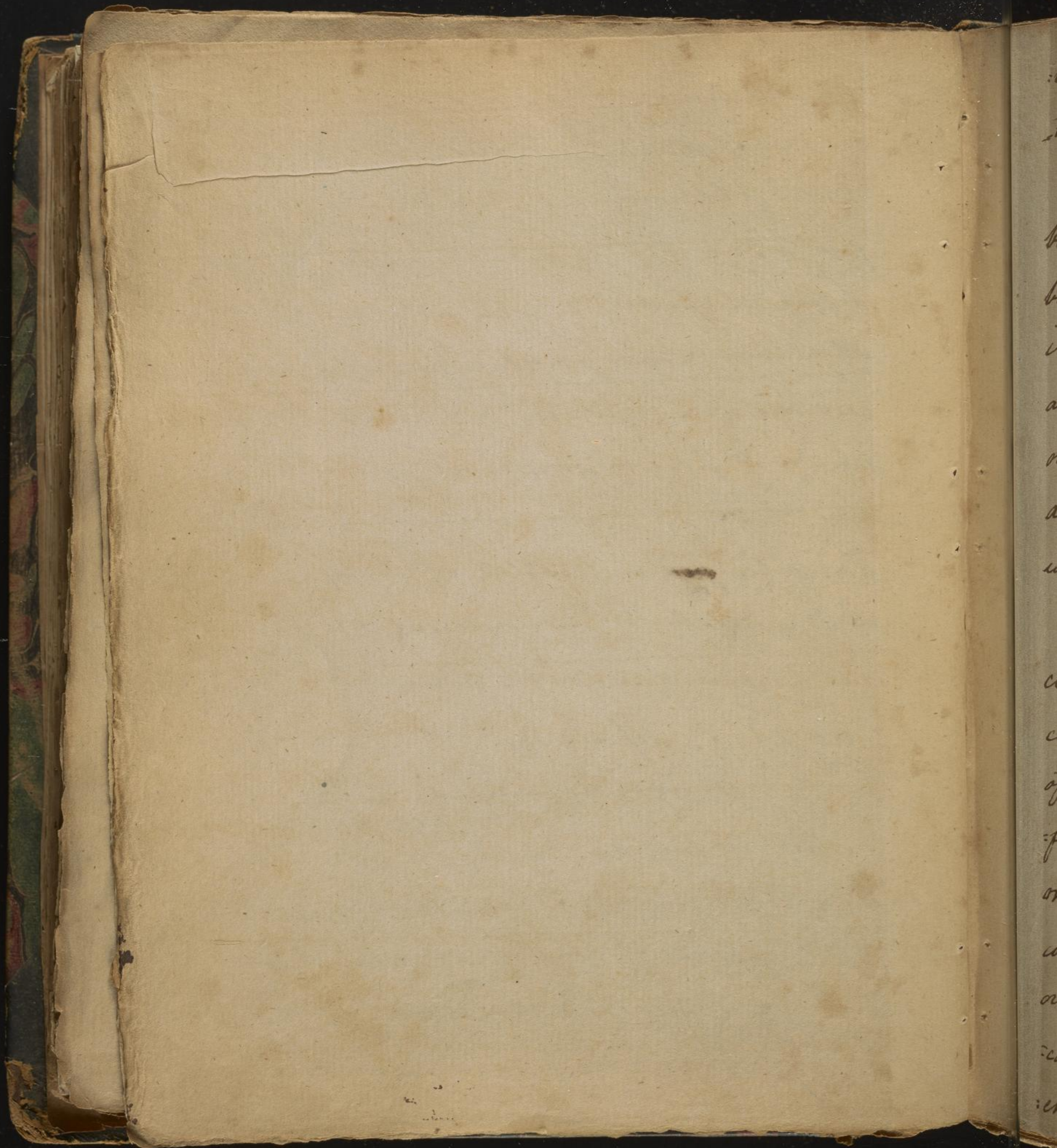
As to Fire, notwithstanding the most investigation of the ablest Chemists, of ^{the} present day, it still remains a doubt, whether it be an elementary principle, pervading the pores of all bodies, or only a particular modification of

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matter, arising from a vibratory motion excited in bodies, which generates heat, and its concomitant phenomena. Those Chemists who suppose fire to be a real substance, or elementary fluid, differ in opinion, as to its natural form, or mode of action. Some suppose the action of fire, or combustion, consists, in a chemical mixture or union of the inflammable principle with pure air; others, in the expulsion of the inflammable principle ^{from} combustible bodies, by means of pure or dephlogisticated air, entering into those bodies, and occupying its place; while others suppose, pure air is composed of the matter of Fire, combined with a peculiar Basis; that combustion decomposes this air, by acting on its Basis, and then the matter of Fire becoming free, assumes the properties of heat, flame, Light &c. —

Neither of these opinions seems to me, to be supported by a sufficient number of unequi-

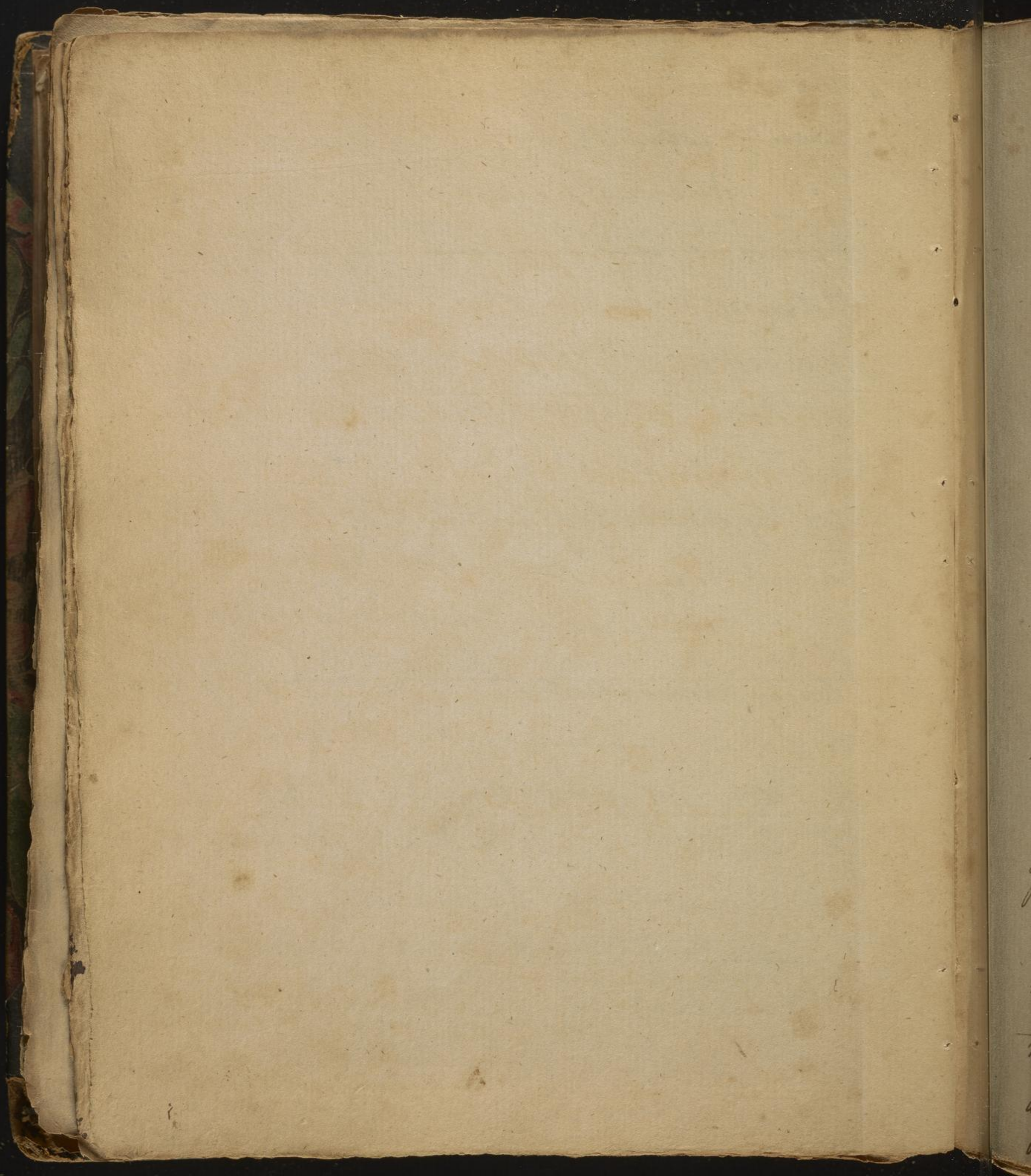


vocal facts, to enable us to pronounce with certainty, which is the most probable. —

Water in its purest state, has generally been considered, as a simple or elementary body; but some late experiments, seem to prove, that it is a compound body, composed of inflammable and pure Air united, by a particular Encheusis, or as Dr Priestly expresses it, water is composed of dephlogisticated Air, united with an aqueous Basis which may be decomposed by Art. —

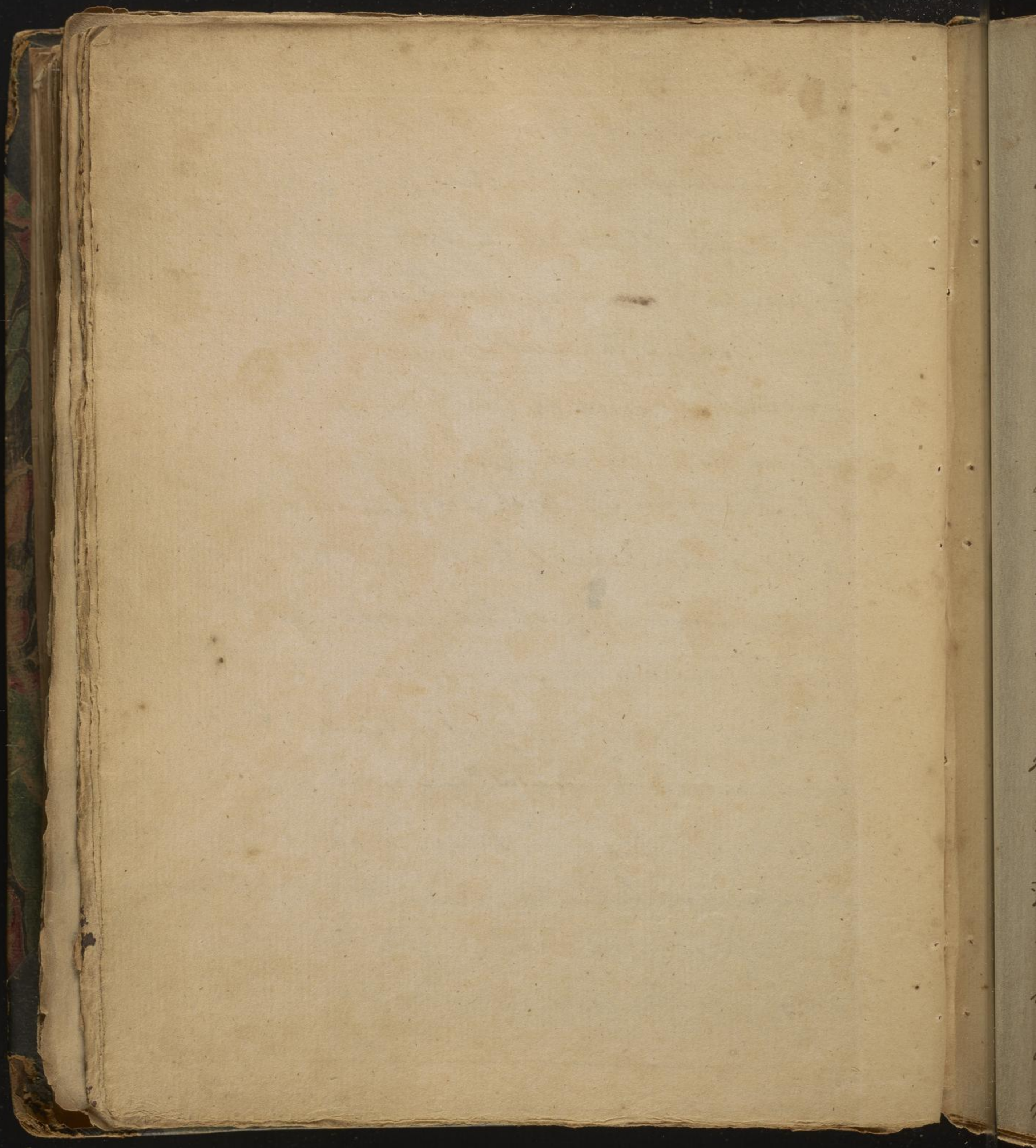
Experiments on atmospheric Air have clearly demonstrated it to be a compound body, consisting of a combination of elastic fluids, of different kinds, possessed of different specific properties, naturally blended together, in one common mass. By Analysis, it is found to contain pure or dephlogisticated Air, Fixed Air, or Aerial Acid, Inflammable Air, and phlogisticated or mephitic Air, united together in different proportions. Besides these component bodies,

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naturally existing in common Air, several kinds of artificial Air may be produced by chemical Art, particularly, the Acid, Alkaline, and Phlogistic Airs; all of which are found to possess the common properties of ~~the~~ aeriform fluids. —

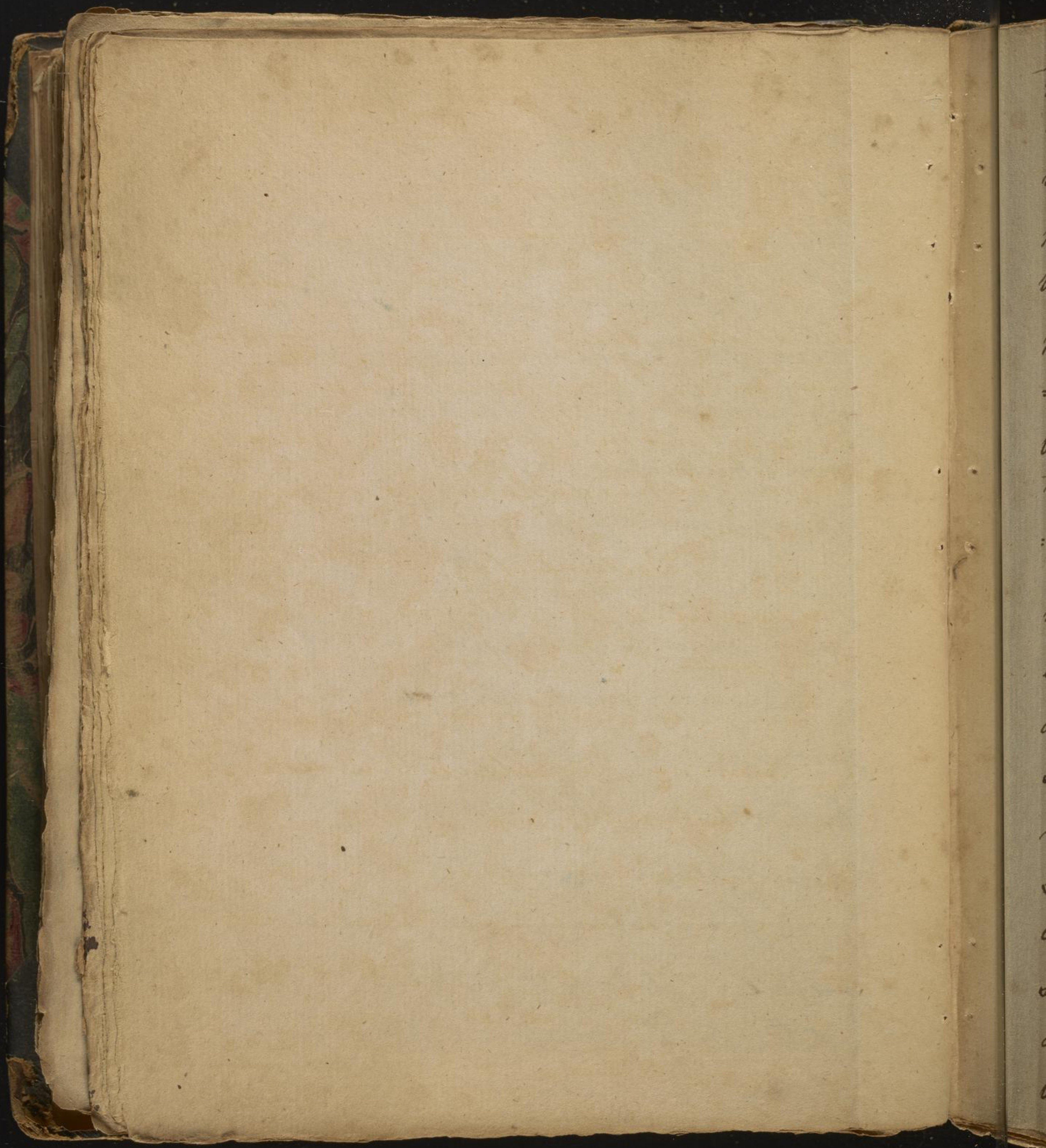
Some Chemists have supposed that there was but one simple Earth, or earthy Basis, in all natural bodies, this in allusion to the doctrine of ^{the} Hermetic Philosophers, has frequent been called a mercurial Earth; but the most accurate examination of the subject, has never yet fairly discovered such an universal earthy basis; on the contrary it is found, that there are a variety of Earths, differing materially from each other, in their chemical properties which have hitherto eluded the most powerful efforts of the ablest Chemists, to decompose them; and therefore according to our Definition, are to be considered as chemical principles of ⁹¹ bodies. Earth



There, by the latest systematic Analysis of the subject, are reckoned five in number; Ponderous Earth, Calcareous earth, Magnesia, Argillaceous earth, and Silicious Earth. —

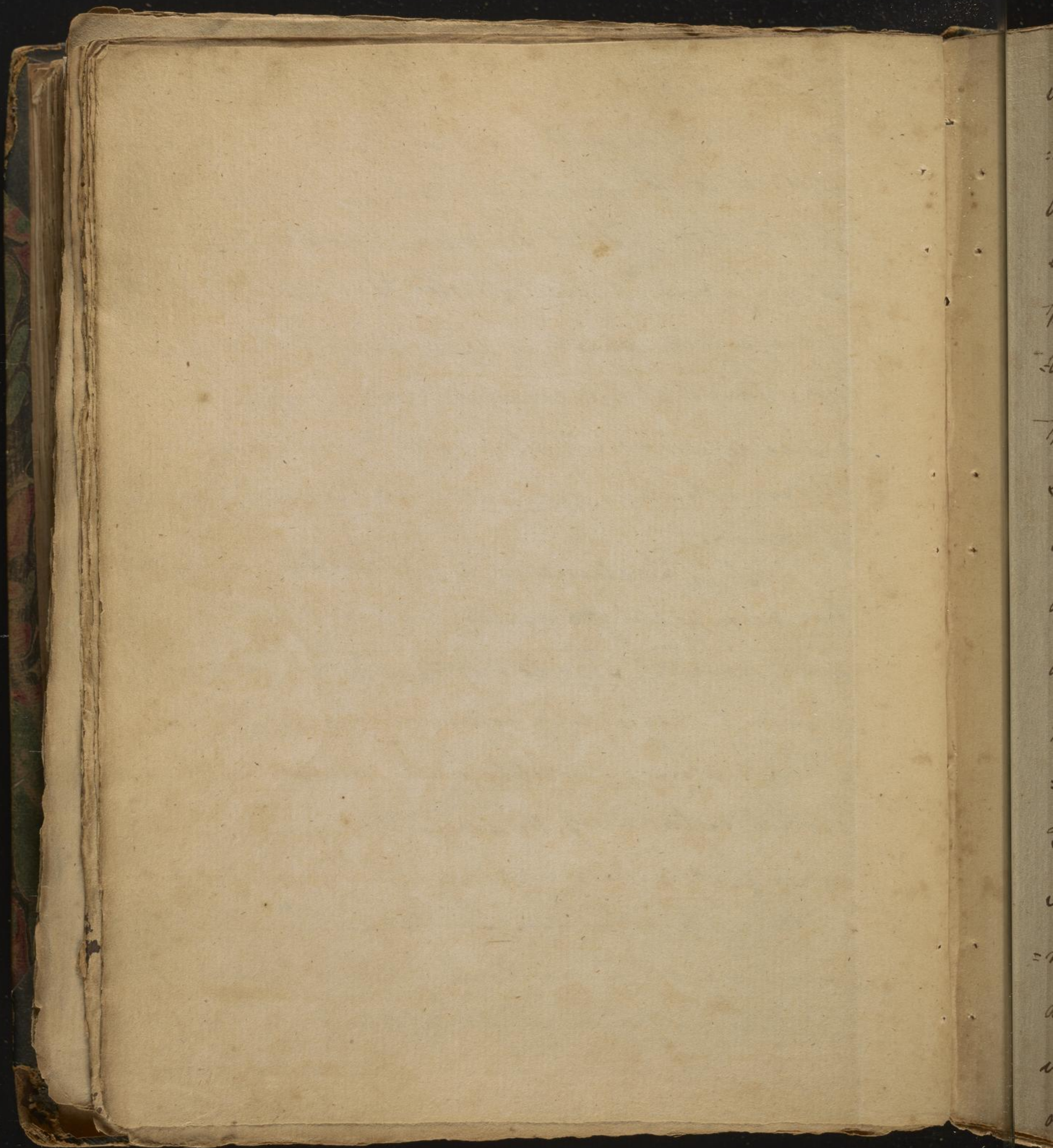
Dr. Stahl a celebrated professor in the University at Halle, in Saxony noted for his singular Doctrine of a Superintending intelligent principle in Physics, has become equally as famous, for being the Author of a chemical Doctrine, of an inflammable principle which he calls Phlogiston, constituting one of the component parts ~~of~~ or chemical principles of bodies. — This theory supposes, that metals in their perfect state are compound bodies, composed of an earth united with phlogiston, forming different kinds of metallic substances, according to the nature of the Earth which constitutes the basis; that by the agency of heat, and other means

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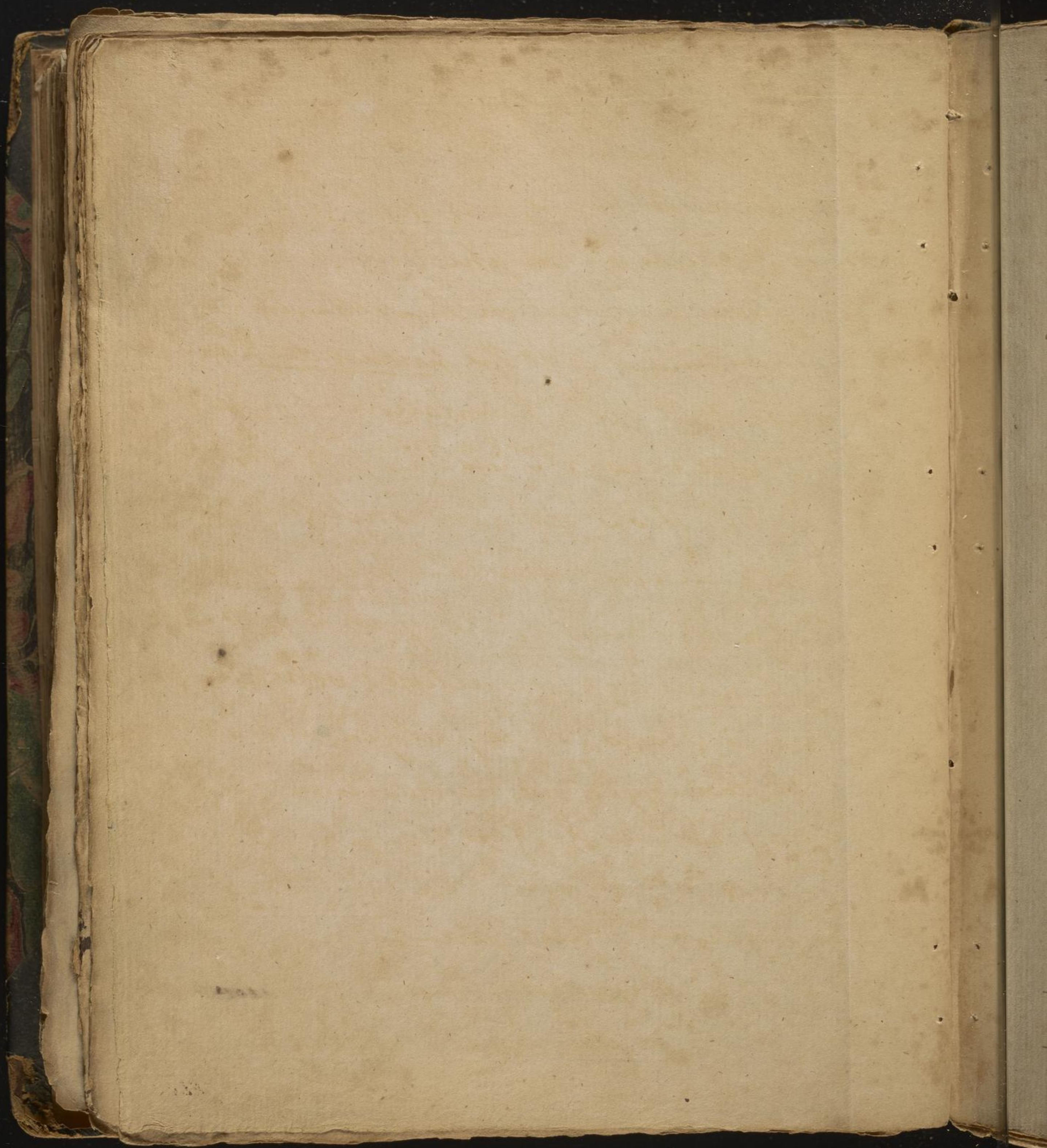


this basis, may be deprived of the Phlogiston, and thereby reduced to a calx, which may be again restored to its metallic form, by restoring the phlogiston. That Sulphur is a compound body, formed of the vitriolic Acid united with phlogiston, which is decomposed by conflagration; and that the combustible property in all bodies, depends on the Phlogiston contained in them, which is dissipated in the process of combustion.

This Doctrine of a phlogistic principle, has been pretty generally embraced by Chemists ever since Dr. Stahl's time, and explains in a very satisfactory manner, many of the Phenomena shewable in Chemistry. It must notwithstanding, be admitted, that there are some facts which appear wholly incompatible with such a theory. In the calcination of some metals, Lead, for instance, the weight of the metal, instead of being diminished by the supposed dissipation, of the phlogiston,

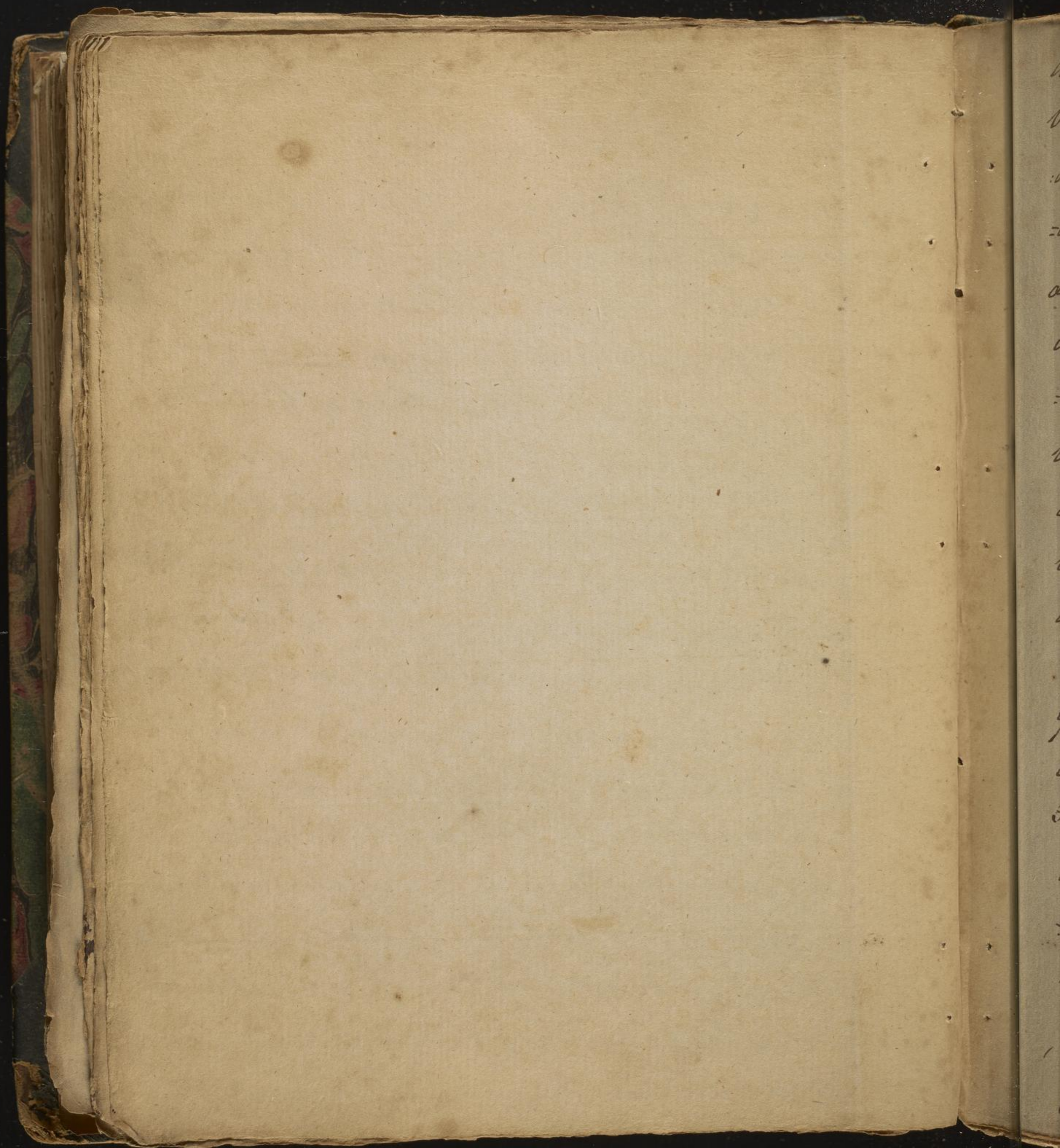


is considerably increased; and in the deflagra-
tion of Sulphur, the weight of the vitriolic
acid obtained, is greater than the Sulphur
employed. A further objection arises to
this doctrine, from our absolute uncertain-
ty of the specific nature of phlogiston, and
the diversity of opinions concerning it;
some supposing it to be a substance sui generis
others, that it is inflammable Air, while
others suppose it to be elementary fire; and
a stronger objection still arises from its
having never yet been obtained in a sepa-
rate state, in any sensible form whatever.
For these, and other reasons of a similar nature
Mr. Lavoisier, a french Chemist, has lately de-
nied the existence of phlogiston altogether,
and has substituted pure Air in its ~~place~~ place
in which opinion he is followed by some
others. —



This new Theory supposes pure Air to be the principle, which produces the chemical changes in bodies, and that all the phenomena which, by the phlogistic theory, are supposed to depend on the separation of phlogiston, according to the pneumatic doctrine, arise from the combination of pure Air, and vice versa. Thus the phlogistic theory supposes Phlogiston constitutes combustibility in bodies, the pneumatic theory that a very great tendency in bodies, to unite with pure air constitutes Combustibility.

In all cases where phlogiston is supposed to be disengaged, the new doctrine supposes combinations of pure Air take place, as in combustion, and calcination; and on the contrary, where phlogiston is supposed to form combinations, this theory supposes the Air to be disengaged, as in the reduction of metals; and that metals are converted
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into calces, not by the subtraction of phlogiston but by the addition of air; and are again reduced to their metallic form, not by the accession of phlogiston; but by the loss of the additional air, that was combined with them, in the process of calcination. And all substances which the phlogistic theory supposes to be compound bodies, containing phlogiston, according to the new doctrine, are simple bodies, which have a great affinity with pure air, as Sulphur, Metals, &c. —

It would be taking up too much of your time, to enter into a full examination of the facts adduced to support this theory; I shall therefore, only observe, that the additional weight which some metals always acquire ~~by~~ in calcination, corresponds very nearly with the quantity of air, supposed to be absorbed in the process. That from experiments made by deflagrating Sulphur, 96 7

Sulphur, it is found that it will not burn without the help of air, that air which has been employed in its combustion will not serve for a new combustion, consequently, during combustion, the Sulphur absorbs the purest part of that fluid; that the vitriolic Acid which results, exceeds the weight of the Sulphur which produced it, by the exact weight of the Air lost, during combustion, by this, the Sulphur is supposed to combine with pure Air which is absorbed, in order to form the Vitriolic Acid; — This Acid is therefore a compound of pure Air, and Sulphur and Sulphur, instead of being a compound body, is only one of 2 principles of the Vitriolic Acid, and requires an union with pure Atmospheric Air, to form this Acid, which is effected by the process of combustion. — There

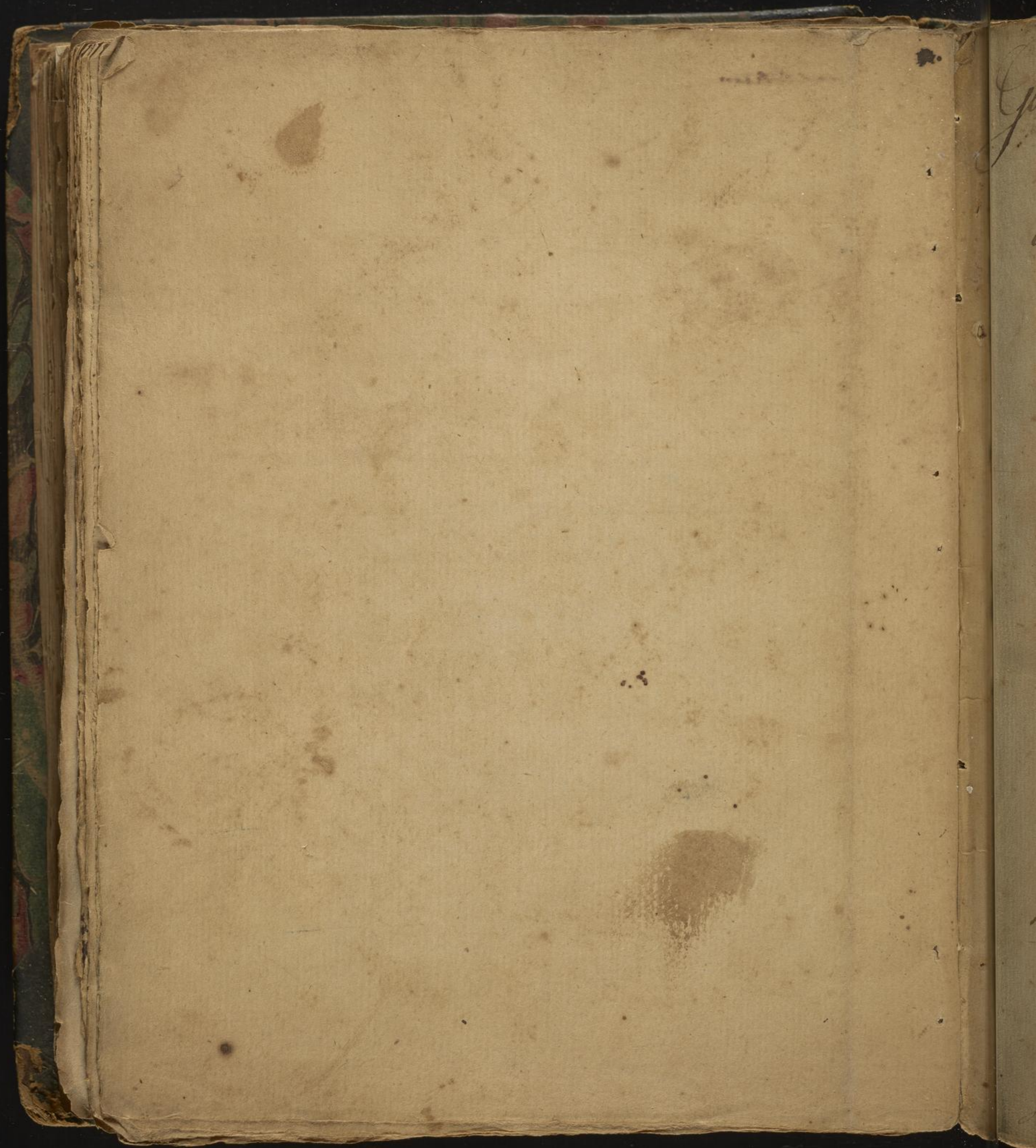
~~Further~~ These Experiments afford a considerable degree of probability to this Doctrine other experiments, on the contrary, render it doubtful. — No method has yet been discovered of obtaining Sulphur by a simple decomposition of the vitriolic Acid. —

Further Experiments, therefore, and a more complete investigation, seem necessary, to establish this curious, new, and interesting subject of Chemical Science. —



Thursday April 10th 1788,

Taken by J. Elmer

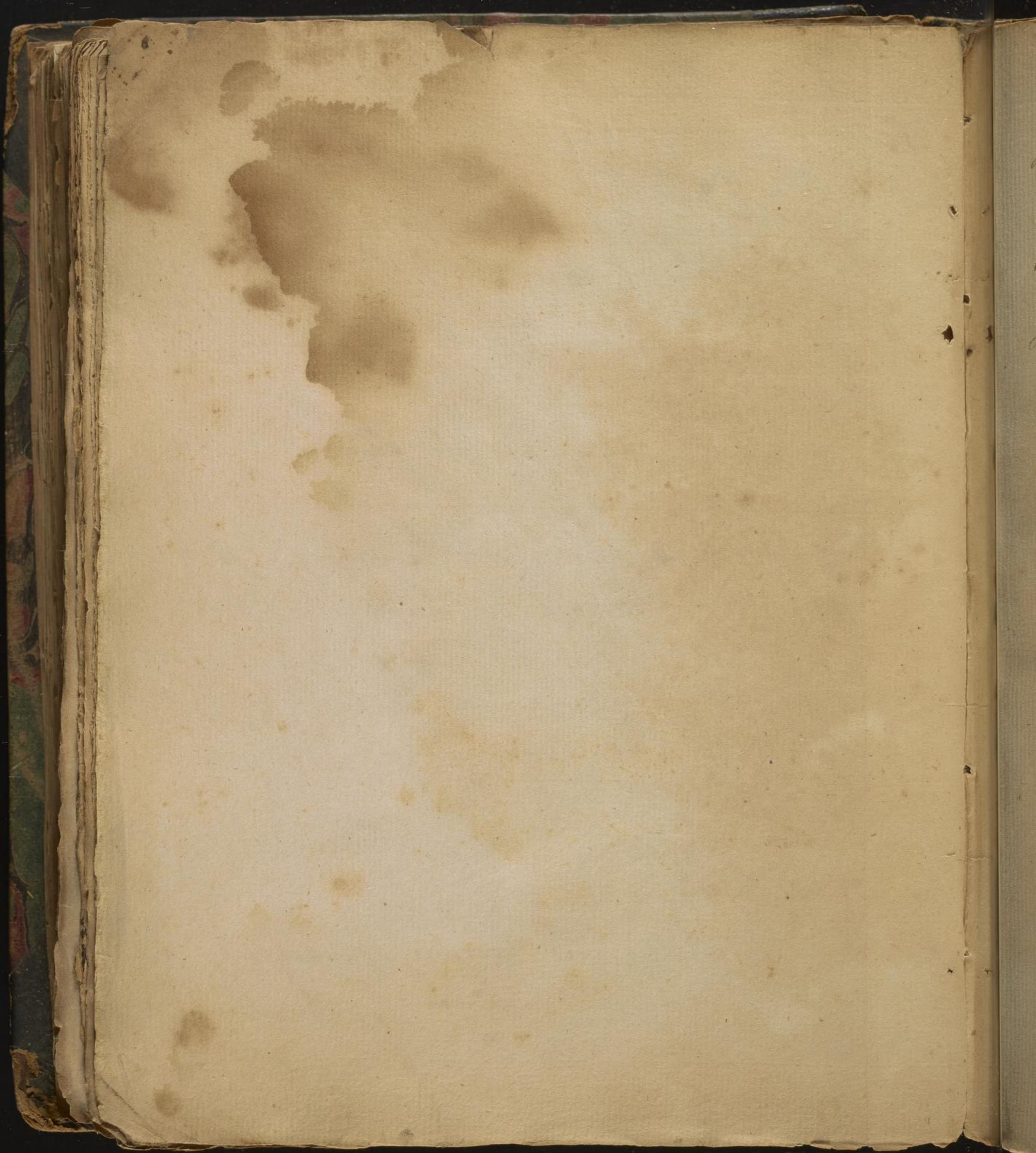


Gentlemen,

At our last meeting I had the honour of offering to your consideration some observations on the chemical principles of bodies, and concluded with a short review of the two modern chemical Theories, to wit, the Phlogistic, and Pneumatic.

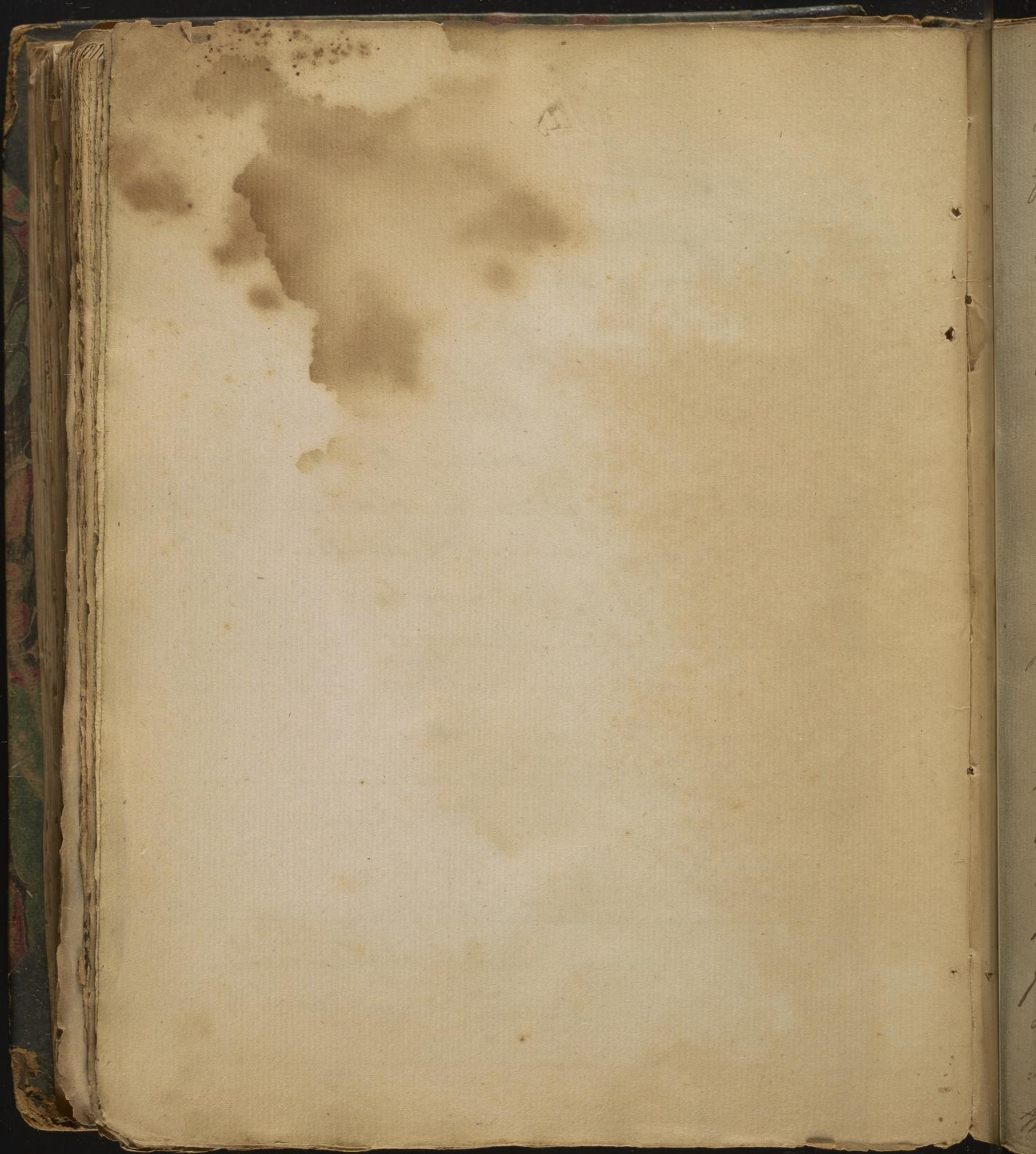
As the latter Theory is founded entirely on the Chemical properties of Air and its component parts, which from the many curious & important discoveries that have lately been made therein, has opened a new field for chemical investigation & improvement, I shall take this opportunity of making some further observations on that subject. —

Air is a fine, transparent, elastic fluid, possessed of a variety of properties generally known to philosophers, and therefore unnecessary to be mentioned on this occasion, further than to observe that all these properties were formerly supposed to arise from Air considered as a simple



elementary body, & have usually been called the principal properties of Air. But it is now clearly demonstrated by Chemical Analysis that all aeriform, elastic fluids are compound bodies, composed of a base more or less solid, united with a certain subtle penetrating substance supposed to be the matter of Heat, or Elementary fire. That the matter of heat when combined with Base, keeps it in a state of solution, & reduces it into the form of vapour, or elastic fluid, in which state it possesses the common properties of pure Air. That these component parts may be decomposed and separated from each other by combination with other bodies, and when thus decomposed are found to possess properties very different from those they possess in a state of combination. —

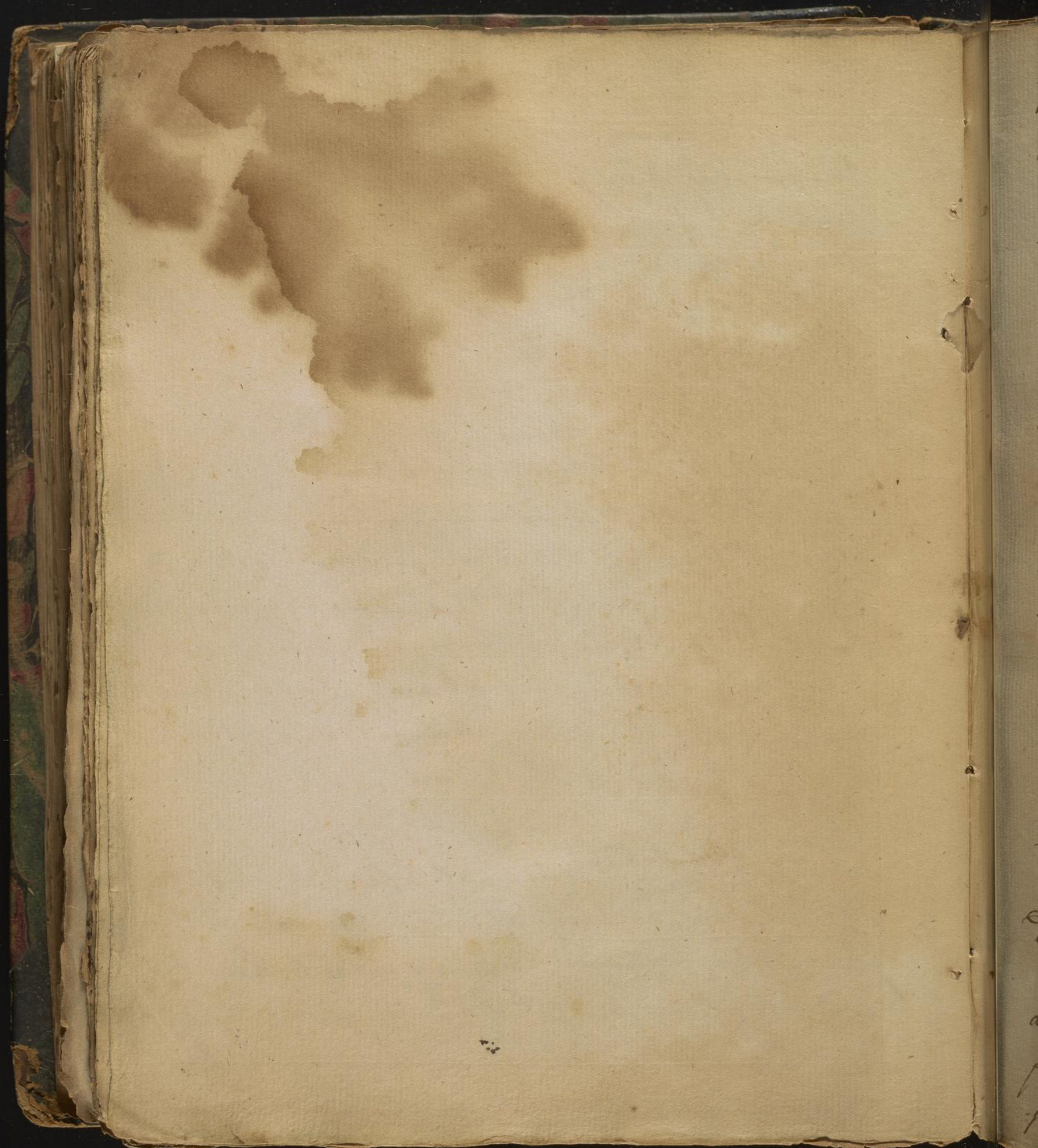
Experiments have further demonstrated, that common atmosphere Air is composed of several kinds of Air essentially different from each other, each of which may readily be obtained in a separate state & when analysed they appear to have different Bases, which constitute their different chemical characters.



The different Airs obtainable from Atmospheric Air, are pure Air, mephitic Air fixed Air, and inflammable Air. The two former of which are contained in the greatest quantity & are always found to exist formally in common Air, so that Atmospheric Air may be said to be composed principally of pure & mephitic Air. —

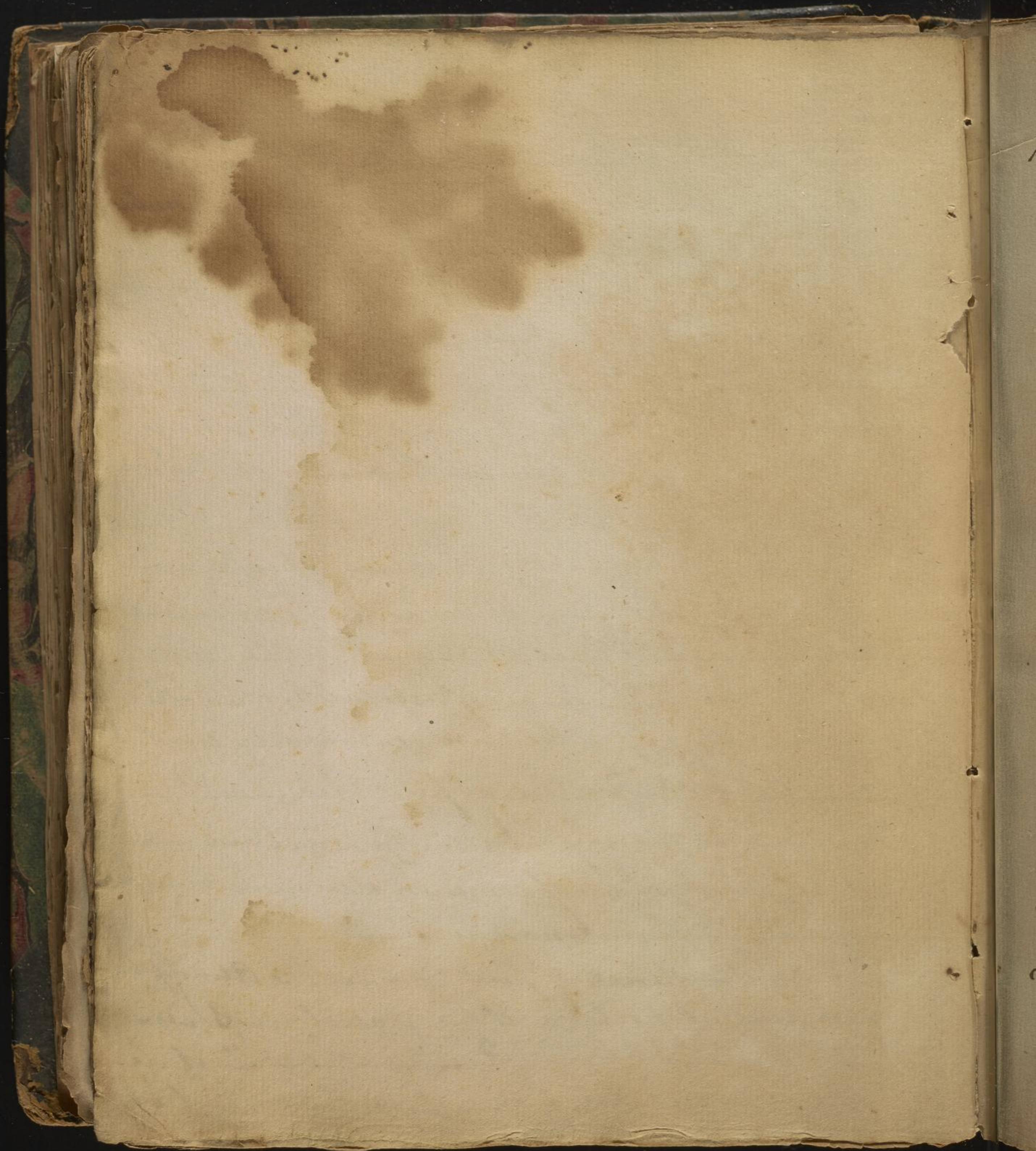
In common one hundred parts of Atmospheric Air contains about seventy two parts of mephitic Air, and twenty eight parts of pure Air. These proportions however are found to vary in different states of the Atmosphere. By a knowledge of the properties of these Airs in a separate state, & the proportions of them which are contained in the Atmospheric Air at any given time, we easily understand the particular properties of the Atmosphere at that time. — Thus pure Air, being the only fluid capable of maintaining combustion, and animal life, & mephitic Air, possessing the property of instantly extinguishing flame and destroying life, we readily know, why only about one fourth of a given quantity of common Air is absorbed during combustion, why the process of combustion is effected more slowly

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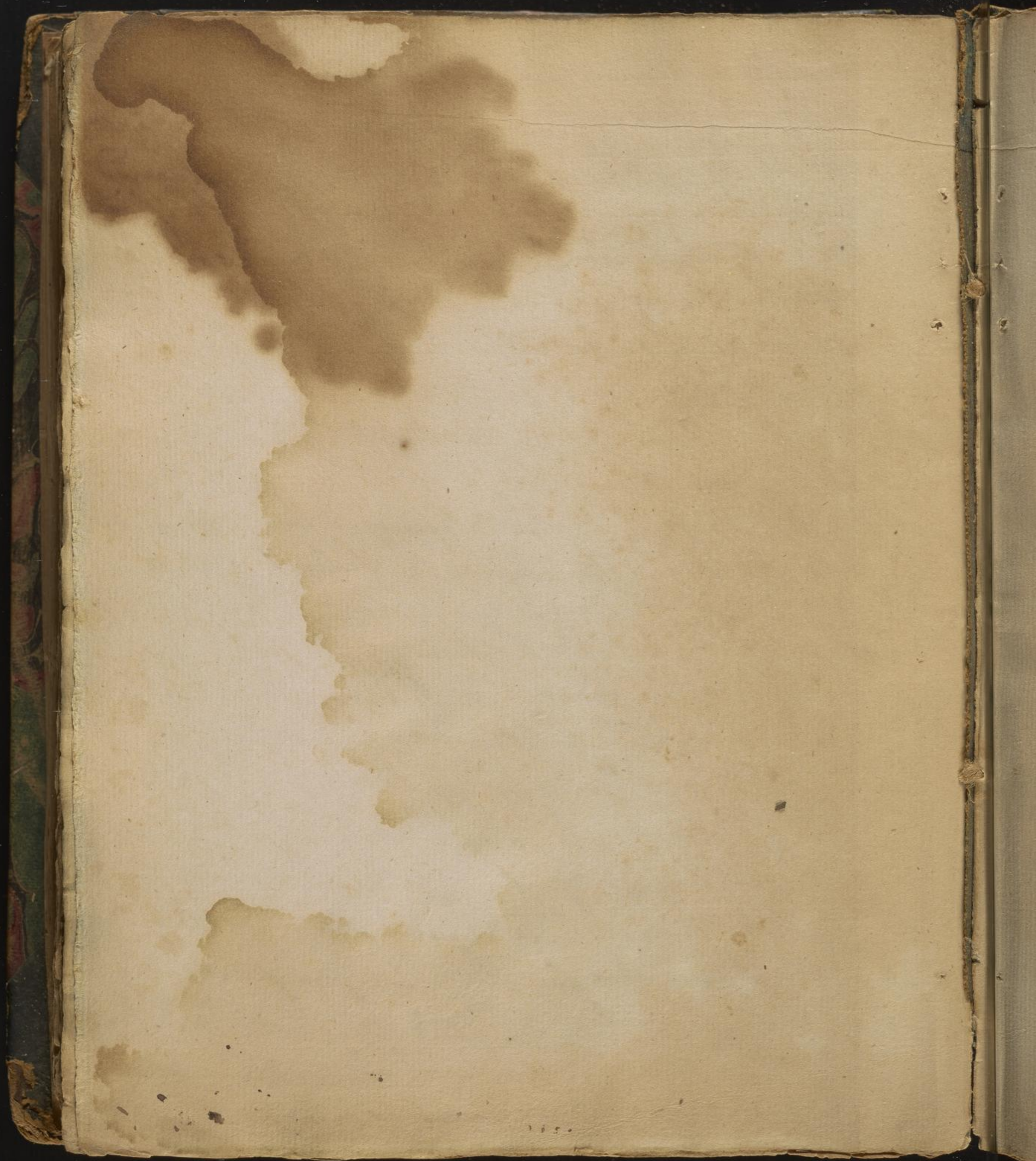
and with it disengagement of a less quantity of light
and heat in atmospheric than in pure Air; &
why Air which has served the purpose of combus-
tion for a certain time, will no longer maintain
combustion or support animal life. Many bodies
alter the state of the Atmosphere by increasing or
diminishing the proportion of pure or vital Air
contained in it; thus Animal Respiration, by the
absorption of ^{the} pure Air in the Lungs, continually
diminishes its quantity in a given portion of the
atmosphere, gradually rendering it effete, and
unfit for further respiration, as happens frequently
in crowded jails, Hospitals, & Ships: on the contrary
other bodies as the leaves of vegetables when acted
upon by the rays of the Sun continually emit &
increase the proportion of pure Air, and thereby
renew and purify the Atmosphere. And many
other phenomena of common Air may be account-
ed for in the same manner. —

The existence of pure Air in the Atmosphere
as a distinct portion of the general mass, was
first discovered by Dr. Priestly, who calls it de-
phlogisticated Air, from a supposition that it



consists of common Air deprived of its usual
portion of phlogiston; others call it empyreal,
vital, or respirable Air. It may be obtained
in a separate state from a variety of substances,
such as metallic Calces, and the Laves of vegeta-
bles, by the agency of Heat & Light. These bodies
appear only to contain only the solid base of
this Air which is fused and reduced to a fluid &
elastic state by the heat employed in the process
obtaining it. -

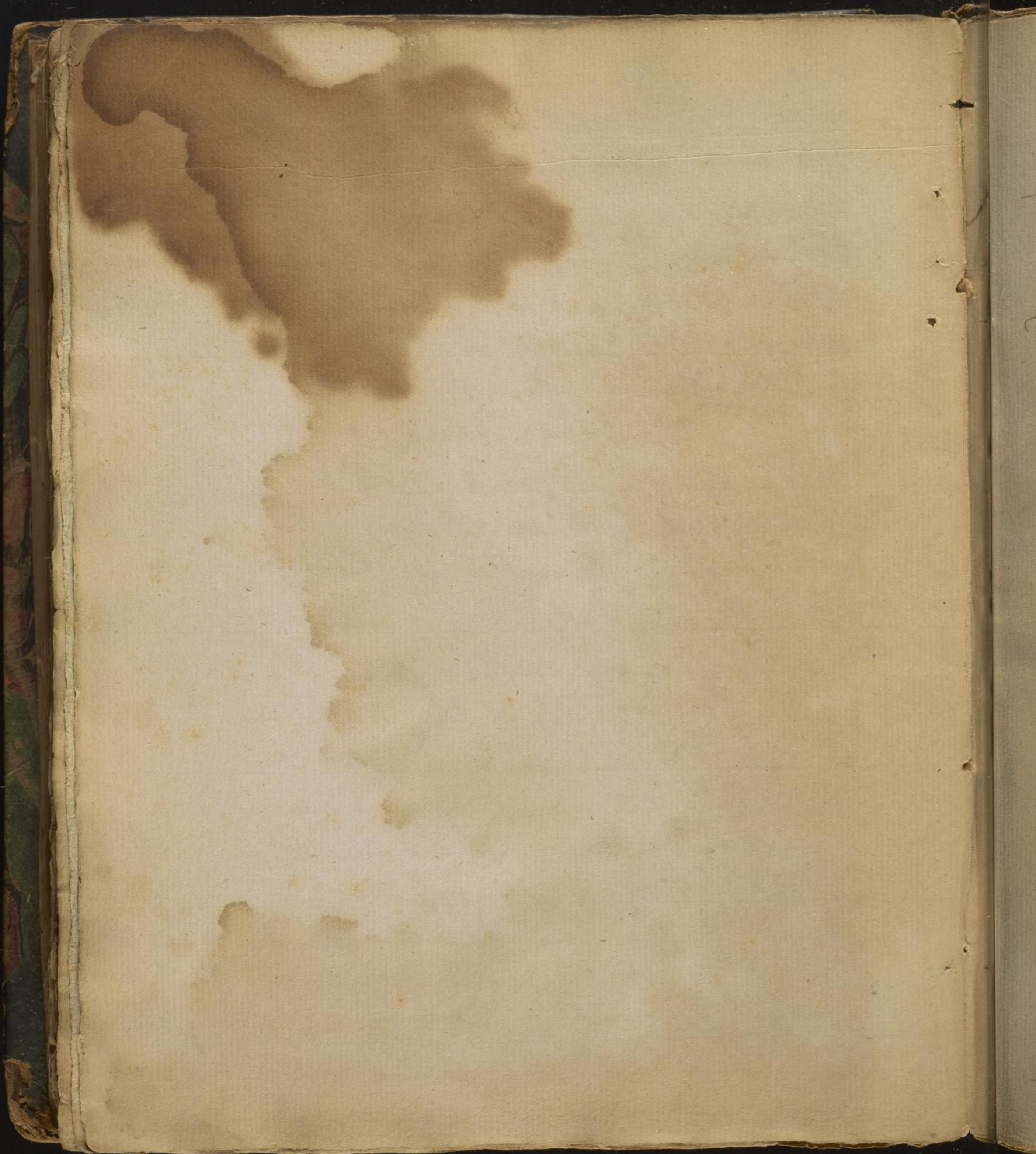
Pure Air is a little heavier than common
atmospheric Air, and is that part of it which
is respirable, or maintains Animal life.
It is the only fluid known at present capable
of supporting flame, or the combustion of
inflammable substances, being three times
as effectual as atmospheric Air for this
purpose; that is to say, a body which requires
four cubic feet of atmospheric Air to be com-
pletely burned, will require no more than one
cubic foot of pure Air for the same purpose; which
is also a proof that the pure Air contained in the
Atmosphere, in its ordinary state does not exceed
the proportion of one ~~fourth~~ fourth part of the



common mass. In the process of combustion, the pure Air is decomposed, the matter of heat and fire being separated and dissipated, while the Basis unites with and becomes fixed in the body which was burned. And in this manner the whole theory of combustion is explained by those who deny the existence of a phlogiston, or principle of inflammability in bodies.

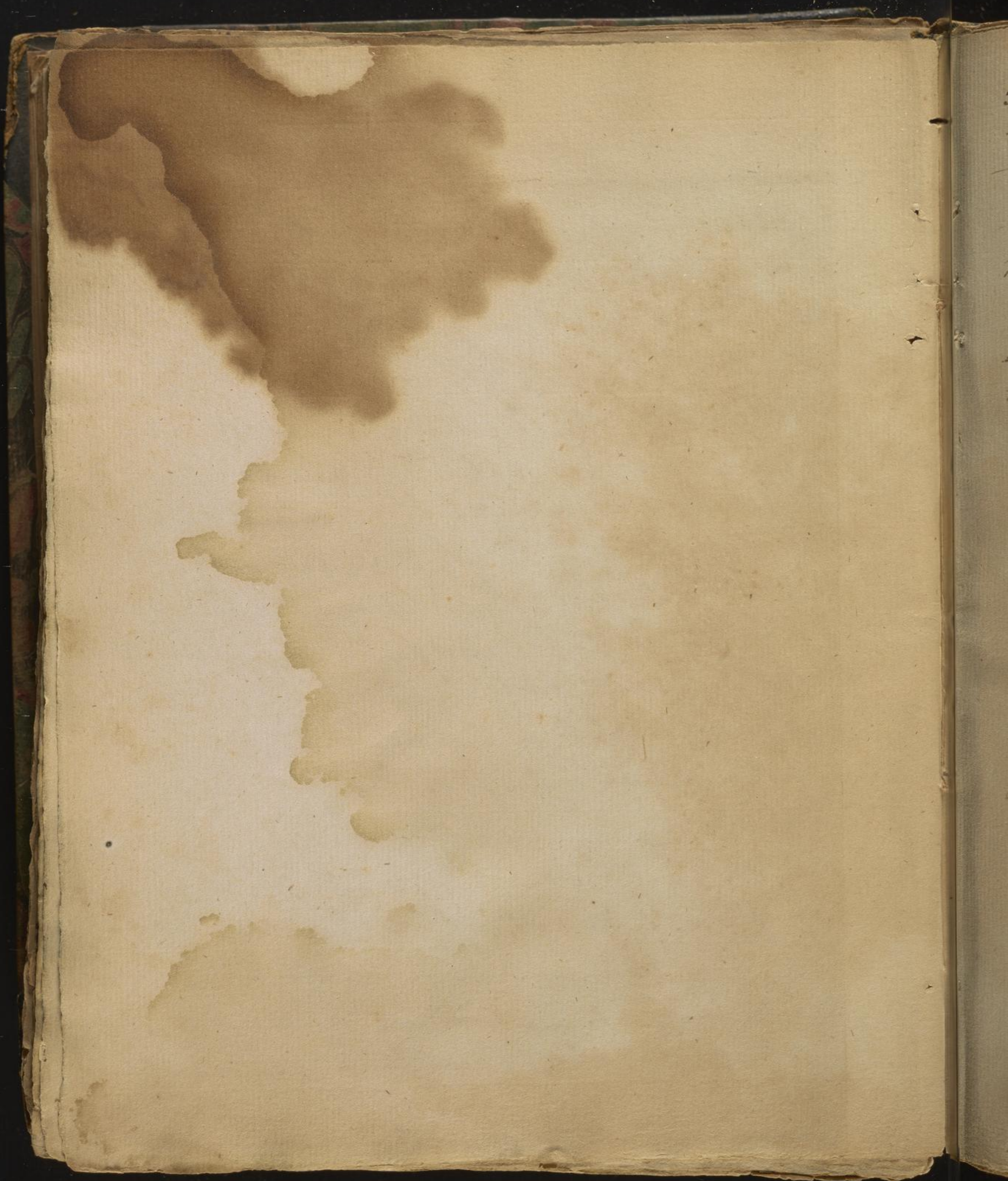
The Basis of pure Air also constitutes one of the component parts of all acid bodies, hence it is called by some Chemists the oxygenous, or acidifying principle in those bodies; and the difference observed in acids is supposed to depend entirely on the different kinds of matter with which this basis of pure Air is united in forming those Acids. The Basis of pure Air combined with metals, by means of heat, or in any other way destroys the metallic quality, and converts them into calces, which may again be reduced into their metallic form, by separating this basis from them. But the most curious and extraordinary discovery respecting this aerial basis, is that it forms one of the component parts of common water; for, if the basis

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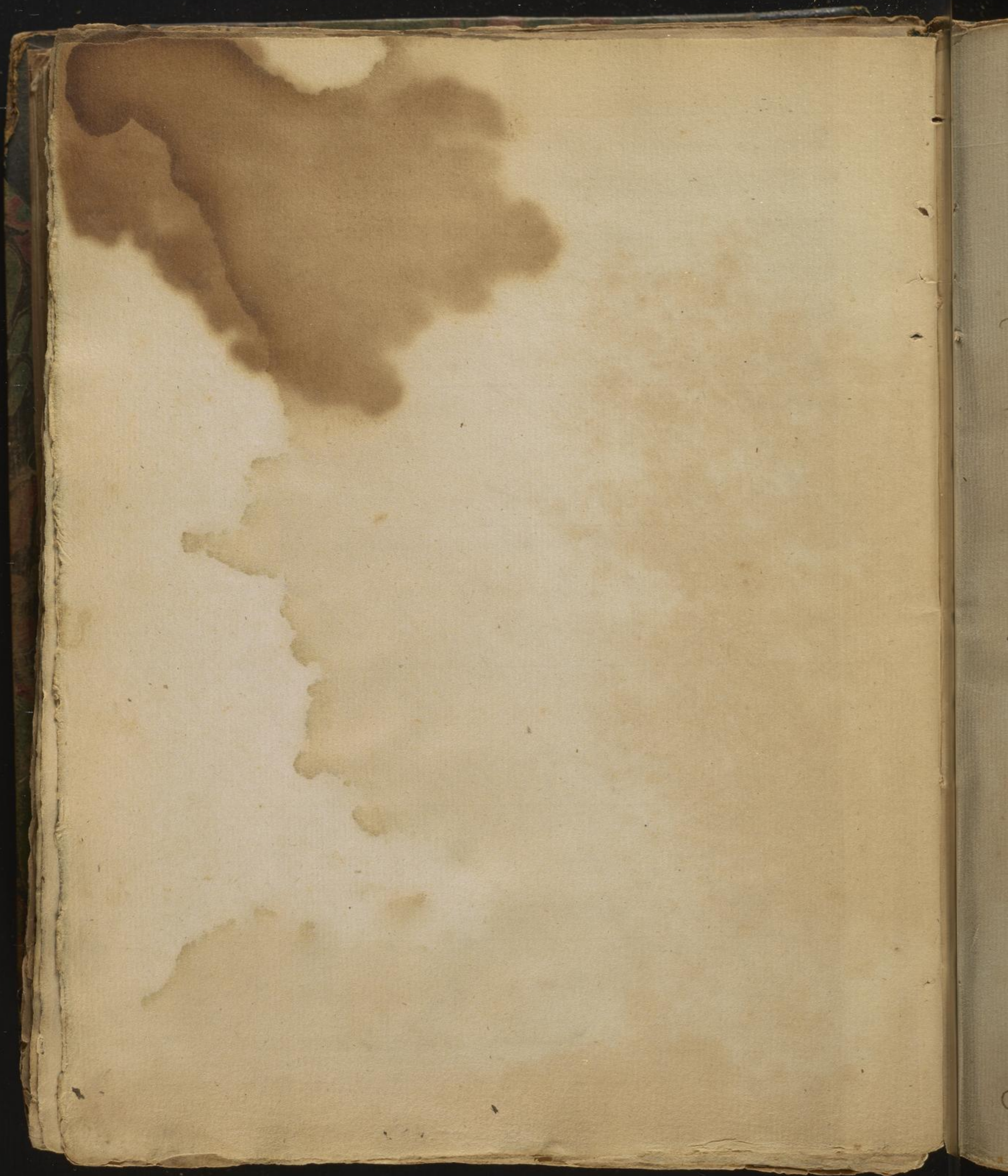
of pure Air be united with the ~~excess~~ of inflammable air in certain proportions, common water is produced nearly equal in weight to 4 two aerial parts employed in the process.

Mephitic Air, as distinguished from fixed Air, with which it has generally been confounded until very lately, is called phlogisticated air by D. Priestly. because he supposes it to be common Air, altered by an addition of Phlogiston disengaged from ~~these~~ bodies by combustion, and by all γ operations, both of nature and art, which he calls phlogisticating processes. But it is now fully ascertained, that this fluid exists ready formed, in the Atmosphere, and is developed in proportion as the pure Air is absorbed, or dissipated. Many discoveries have lately been made respecting the nature & properties of this Air. It is specifically heavier than atmospheric Air. It instantly extinguishes flame and very soon deprives animals of life when plunged into it. — Mixed with pure Air in the proportion of about seventy two parts of mephitic, to twenty eight parts of pure Air, artificial atmospheric Air will be formed.



If united with pure Air in a greater proportion,
becomes noxious to animals, more or less according
to the quantity of mephitic Air contained in the
mixture. — Three parts of mephitic Air and seven
parts of pure Air exposed to the action of the elas-
tic fluid, produce the nitrous Acid. This discovery
clearly explains the Theory of the formation of
the nitrous acid in the Atmosphere, and the re-
markable fulminating property of that singular
fluid. Five parts of mephitic air combined
with one part of inflammable air, forms Volat.
Alkali. As all animal & some vegetable substances
contain mephitic Air, it is in consequence of
this combination effected by the action of fire
or putrefaction, that Volat. Alkali is obtained
from them. Neither Water, Earths, nor Acids,
have any sensible action on this Air. —

These remarkable properties of mephitic Air
are more particularly entitled to the attention
of Physicians, as they throw great light on the
medical properties of Air, discover the cause of
its salubrious & noxious effects in certain cir-
cumstances, explain the Nature of animal &
vegetable substances, the formation of Volat. Alk.
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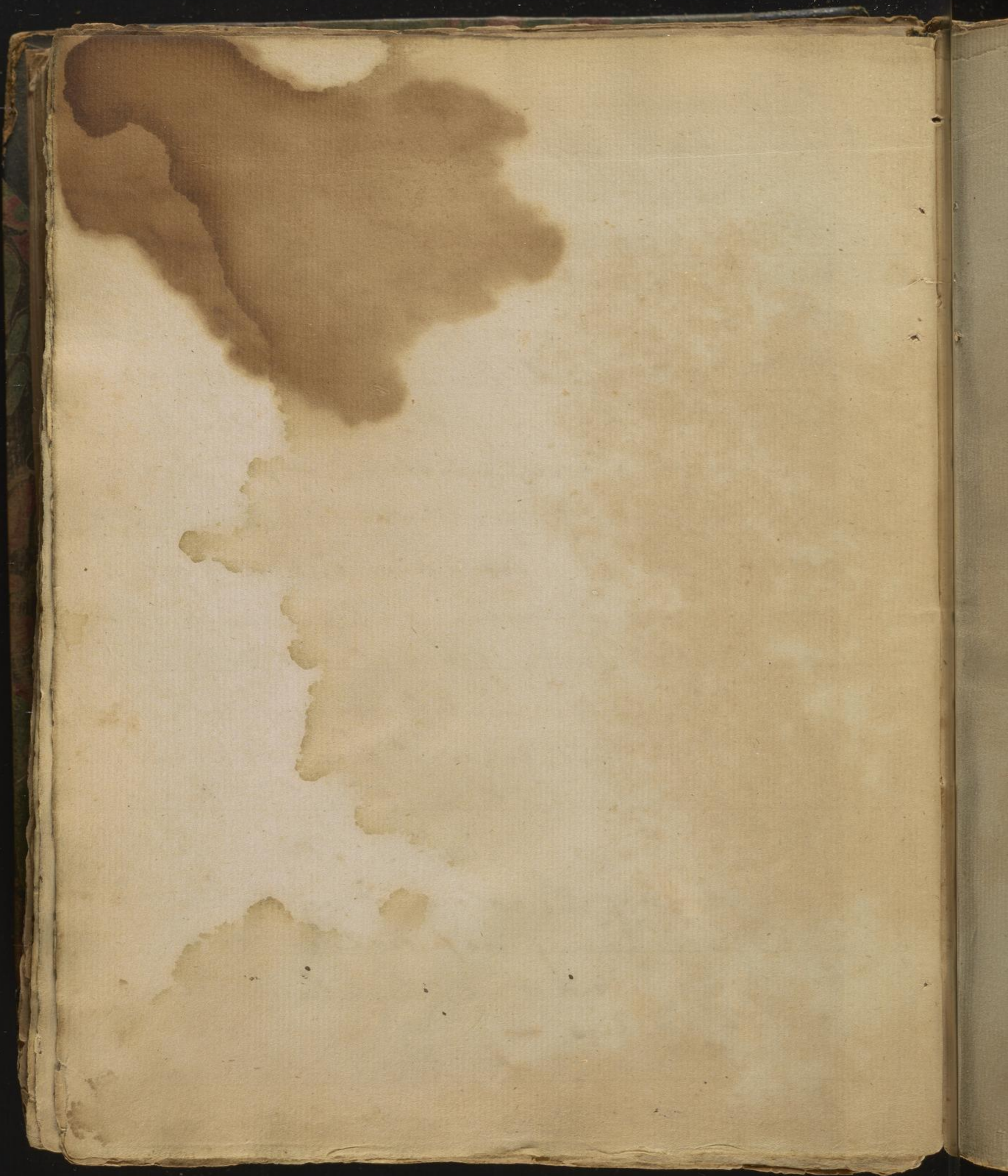


The production of Nitrous Acid, and the nature
and properties of putrefaction, —

Various methods are employed for obtaining
it in a separate state. The most usual process
consists in exposing *Hepar sulphuris* in a liquid
state, to a given quantity of Atmospheric Air
under a glass vessel; the liver by degrees absorbing
the pure Air & leaving the mephitic Air behind.
The process of combustion also absorbs the pure
Air, and leave the mephitic Air behind; this
accounts for the suffocation and death which
soon follow from burning charcoal, or other
combustible matter in a close room.

All writers until very lately have
confounded this Air with fixed Air; but it is
easily distinguished from it by being specifically
lighter, by having no sensible taste or smell, by
not changing the colour of vegetable blues,
and by occasioning no precipitation in lime
water; the reverse of all which being the proper-
ties of Fixed Air. —

The existence of Fixed Air is the discovery of
D. Hales; but D. Black was the first who invested

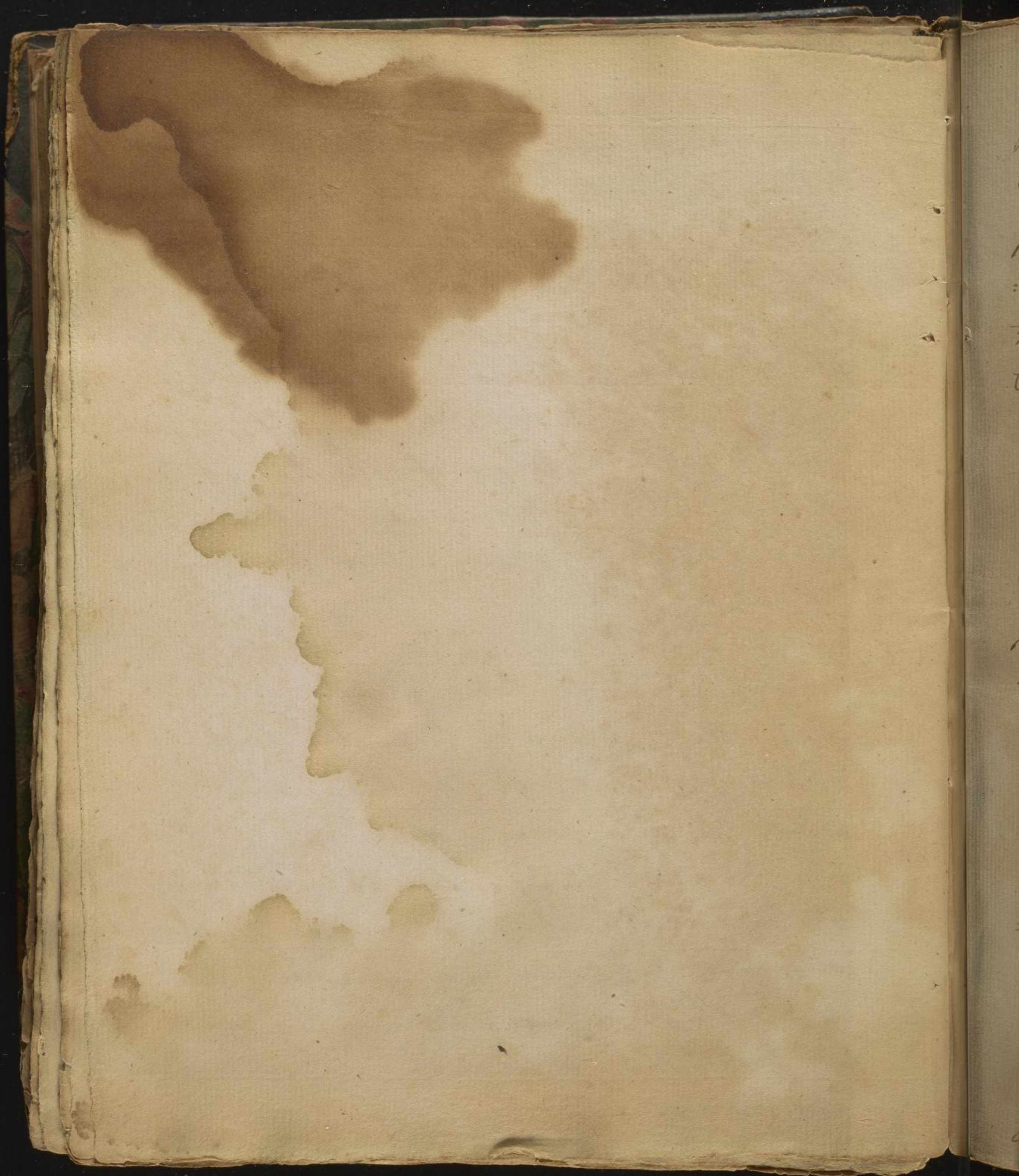


gated its true nature and properties.

Mr. Bride, Haller, and some others, suppose it to be the vinculum, or uniting substance, in all bodies; it is specifically heavier than any other air, being about one third heavier than common air. It possesses many of the properties of Acids, changes the colour of vegetable blues red, is acid to the taste &c. hence it is now frequently called by Chymists, the Aerial Acid; and as it is most commonly obtained from cretaceous Earths, it has also got the name of Cretaceous Acid.

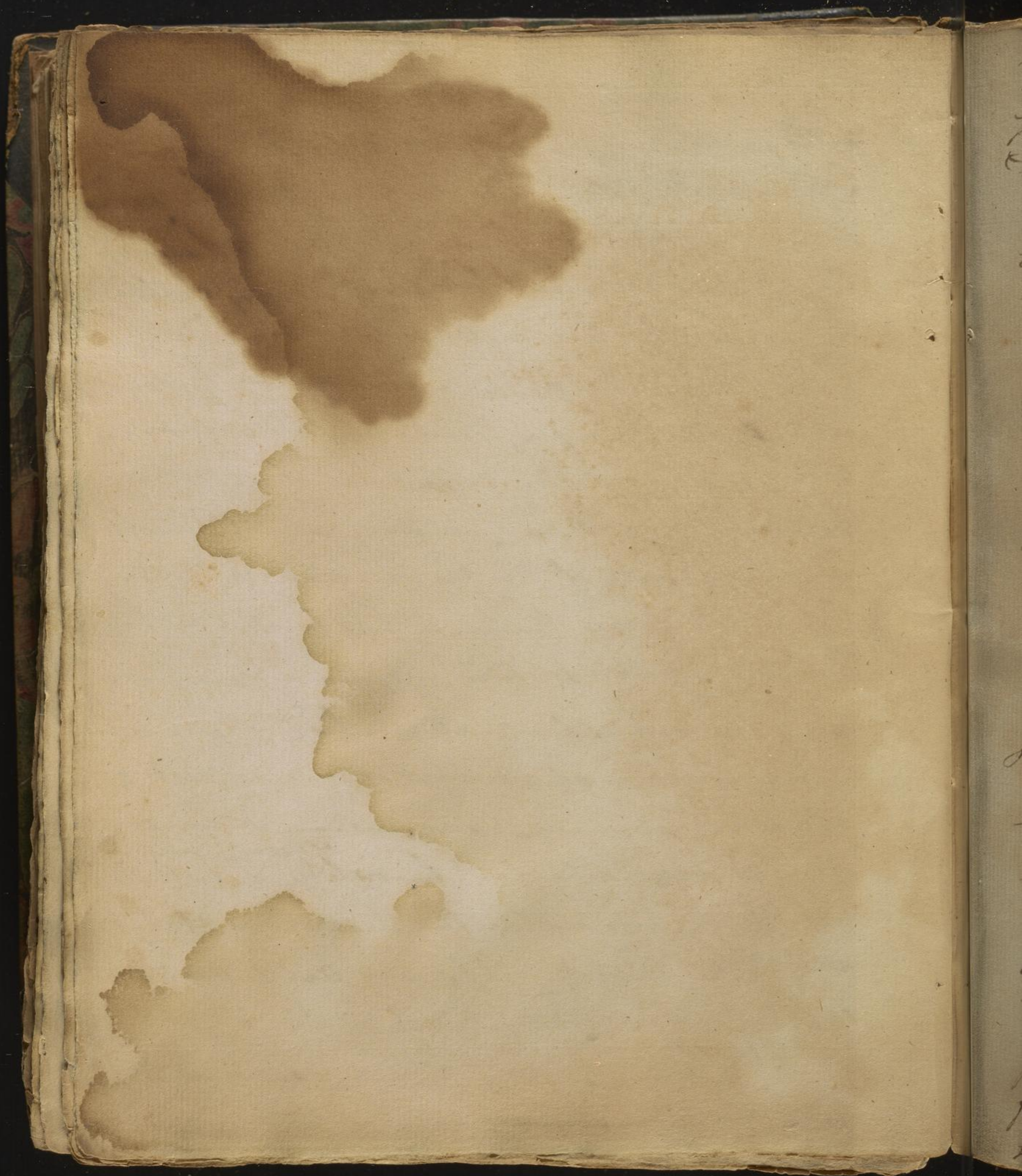
Fixed Air is found to enter into the composition of all bodies, whether solid or fluid; from which it may be separated, from which, it may be separated, & with which it may be combined, by a variety of processes both of nature and art. It is formed by and union of the basis of pure air, or Oxygenous principle with Charcoal, or the carbonaceous principle.

In this manner fixed air is generated by the process of fermentation, and in caverns and mines. —



The discovery of Fixed Air has opened a new field for the investigation of Chemistry and Natural Philosophers. By proposing the specific properties of Acids it has added one to the number of those Chemical bodies. It clearly explains the cause of the effervescence which mild Alkalies, Chalk, Calcareous Earths, and Magnesia, produce with Acids stronger than itself. It informs us of the nature of the difference observable, between the mild and caustic state of Alkalies, in consequence of this Air being united with, or separated from them. It has taught us the nature of Damps and mephitic Caverns, & an easy and effectual method of removing those noxious fluids out of mines, wells, & other subterraneous caverns. — It has enabled us to obtain a perfect knowledge ^{of its component parts} of most mineral waters, particularly the Acidulous & Sulphureate waters, and of preparing artificial waters exactly similar to them. —

Inflammable Air, is a discovery of later date than ~~this~~ any of the former.



The properties which it possesses are equally singular with those we have already mentioned. It is the lightest of all the Aëreiform fluids. When in its greatest purity it is thirteen times lighter than Atmospheric Air. This great rarity of inflammable Air was first ascertained by Mr. Cavendish, in the Year 1786, and its principles first explained by Dr. Black soon after. By itself, it extinguishes flame, and kills animals; but it suddenly takes fire in pure Air, by the contact of the Electric spark, or any combustible body, in a state of combustion, or ignition, and burns with a brilliant flame.

Fourteen parts of this Air will absorb eighty six parts of pure Air, during its combustion, and will form pure water nearly equal in weight to the Air employed. As water is compound of the basis of inflammable and pure Air, united, all substances which have a greater affinity with ^{one of} these two principles of water, than they have with each other, will decompose this fluid. Thus Iron, Lime, Charcoal & Oils are found to decompose water, because those bodies have a greater affinity with the basis of pure



Air, than this Air has with inflammable Air, consequently the pure Air which enters into the composition of water will separate from the inflammable Air, and unite with those bodies. It is this decomposition of Water by Iron & Zinc, which produces inflammable Air during the solution of those metals in the vitriolic Acid as happens in the process commonly employed for filling Balloons with this kind of Air. Inflammable Air on the contrary will decompose the vitriolic Acid & metallic Calces by combining them with the pure Air contained in those bodies, by which means, the Acid is reduced to sulphur, and the Calces to the metallic state. —

The leaves of vegetables likewise in contact with the Light, possess the property of absorbing the inflammable Air of Water, and thereby, disengaging the pure Air, which enters into its composition, and in this manner it is that the quantity of pure Air is increased in the Atmosphere by vegetation. —

All bodies capable of combustion, are found to contain Inflammable Air, of which they ¹¹⁰

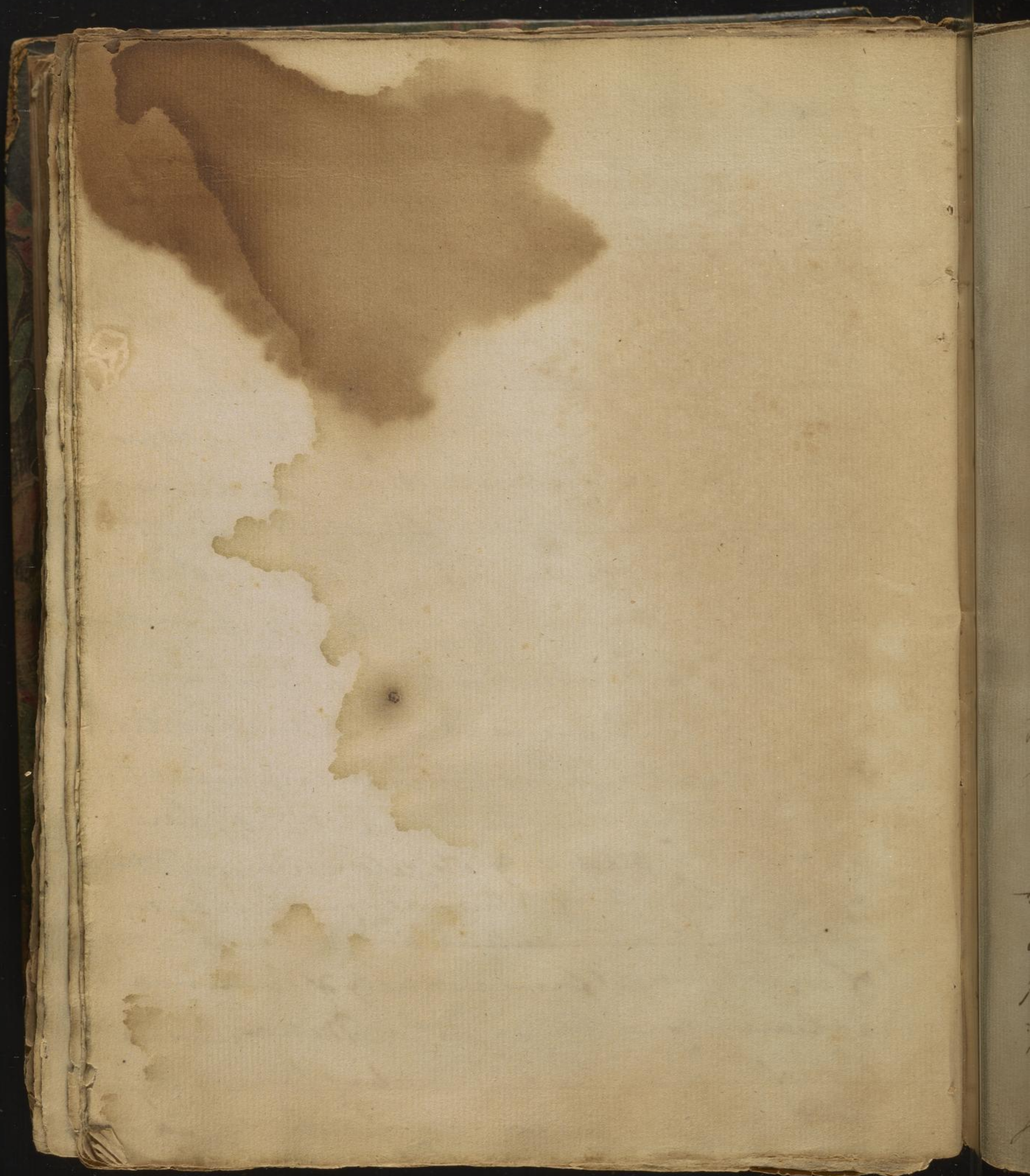


may be deprived by the process of combustion.

Simple combustible bodies, after having been burned, may be restored to their original state, by renewing the inflammable Air, they had lost by combustion. —

From these experiments some Chymists have supposed, that inflammable Air is the principle upon which the combustibility of bodies depends, and is the same substance, which the Partisans of the phlogistic theory, call Phlogiston; but this subject has not been sufficiently investigated to ascertain the truth or falsity of such an opinion.

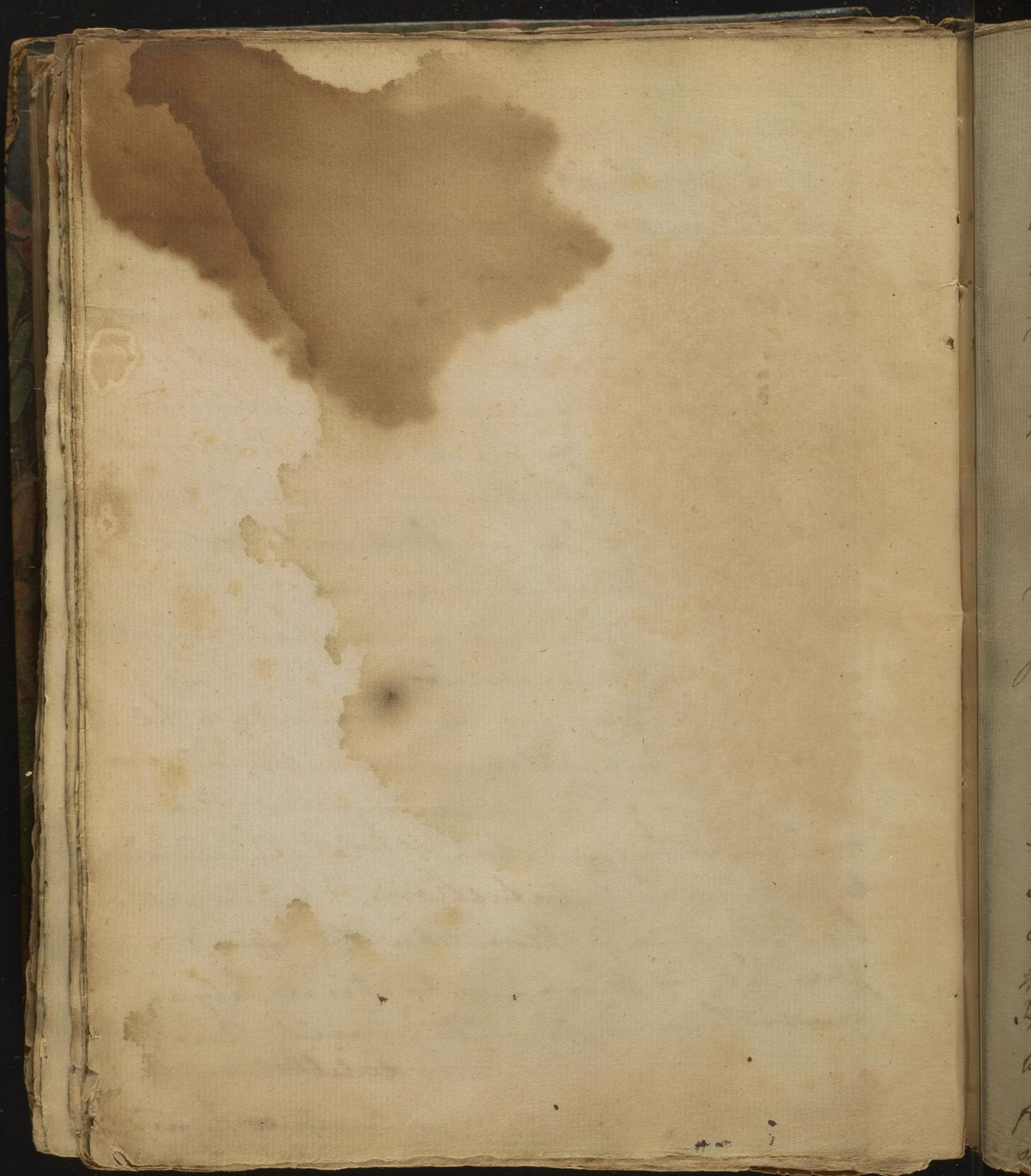
Inflammable Air is the principle cause of many phenomena both of Nature and Art. It is produced and disengaged in large quantities in mines. When elevated in the Atmosphere, & set on fire by Electricity, its detonation constitutes a part of Lightning & Thunder. — When disengaged in small quantities and put into a state of combustion, it forms a variety of luminous appearances in the Air such as Meteors, Aurora Borealis, &c.; and the fulminating property of Gun powder, and other similar compositions, depend on



the sudden disengagement, and rapid inflamm-
-ation of this Air. —

There are all the Airs are naturally ob-
tainable in a simple form, from the common
Mass of the Atmosphere. They may be variously
united with each other, so as to produce a vari-
-ety of compound Airs; amongst the most compli-
-cated of which we may reckon Common Air.
Thus Nephetic Air mixed with inflammable
Air constitutes the Inflammable Air of Marshes.
It is produced by the putrefaction of vegetable, &
animal substances. It is disengaged from stag-
nant water, and in all places where animal
matter putrefies in water and may be set on
fire by applying any burning body to the
surface of such water, immediately after agi-
-tating it. — This Air accompanies, precedes,
or follows the formation of volat. Alkali which
takes place in putrefaction. It burns with a
blue flame, and detonates with difficulty, in
pure Air, by which marks it is readily distin-
-guished from simple inflammable Air.

The Air obtained by distillation from
some vegetable matters, in particular from Tartar



hard woods, Charcoal, and some other substances is a mixture of inflammable & fixed Air; it burns with difficulty, and the fixed Air may be readily separated from the inflammable Air, by means of Lime Water, Caustic Alkali, or other similar substances. —

There is a species of Air which, tho' it never yet has been obtained from the Atmosphere, is notwithstanding known to exist naturally in the bowels of the Earth. As it may also be artificially produced by decomposing Hepar Sulphureus with Acids, and has a strong fetid sulphureous smell. It is usually called Hepatic Air. The state in which this Air most commonly presents itself to us, is in combination with Water, in the form of those warm, mineral Waters, erroneously called sulphureous waters, as they contain no Sulphur in their composition. Hepatic Air partakes of many of the properties of mephitic & inflammable Air. It kills animals and burns slowly with a slight bluish flame. But it is readily distinguished from all other Airs, by its very strong fetid smell. — . — . —

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Notes from Fourcroy's Lectures

Chemical Affinities

four genres of aggregates are distinguished —

1. The hard or solid aggregate —
as stone &c —

2. The soft aggregate —

3. The fluid aggregate —

4. Acetiform aggregate —

When two bodies of a different nature endeavour to unite it is called Affinity of Composition or combination.

1. Law of Affinity of Composition

Bodies of the same substance form only a simple aggregate — But the Affinity of Composition is the strongest when bodies of a different nature unite —
Thus, the Acid Salts & Alkalies form a perfect combination —

2 Law of Affinity of Composⁿ.
The Affinity of Composition takes
place between bodies in the point
of contact only -

3 Law
The affinity of Composition takes
place between small bodies only -

4 Law
The affinity of Composition may
take place among several bodies -

5 Law
That the Affinity of Composition
may act betwixt two bodies
it is necessary that one of them
be fluid -

6 Law
The affinity of Composition is in
the inverse ratio of the affinity
of aggregation -

7th Law
When two or several bodies unite by
the Affinity of Composition their
temperature changes in instant of their Union.

8th Law -

Two or more bodies which have united by the Affinity of Composition, form a Substance whose properties are necessarily different from those which any of the Substances had before their union.

9th Law -

The Affinity of Composition is measured by the difficulty which is found, in destroying the combination formed between two or more bodies.

10th Law -

All Bodies have not the same degree of Affinity to each other; and by the Aid of observation, we can determine the rank or degree of this force, which subsists between the different bodies of Nature.

decomposition when one body takes the place of another

precipitation - an acid & Metal united the addition of an alkali which has a greater affinity for the acid & the Metal is precipitated

false precipitations

from precipitates comprehending bodies which are not altered in their properties by decomposition -

Example, Ag^+ is in a soln of Vitriolat. Tartar. & K^+ has more affinity to the water than Ag^+ salt in pure precipitates. vice versa,

elective Attraction -

double Attraction - Example let

present to Vitriolat. Tart. a compound of Nitrous Acid and Lime at the very time this Acid seeks to unite with the alkali of the Vitriolated Tartar, the Nitric Acid endeavours to combine with the Lime so that if decomposed of Vitriolated Tartar by Nitrous Acid it is completed by Lime

Q. For what purpose are the Words Sulphates, Nitrates, & Murates used?

A. To Denote Combinations of the Sulphuric, Nitric and Muratic Acids.

Q. How is the kind of Combination denoted?

A. By adding to the generic Word the Name of the Body which is Combined with Acid. — As the Sulphat of Pot-ash expresses the Combination of the Sulphuric Acid with Pot-ash.

Q. From What does the Difference in Acids arise?

A. Almost always from the greater or less abundance of Oxigene. —

In the Case the acid assumes the Epithet of oxygenated hence the oxygenated muratic acid. Oxygenated Sulphuric acid.

In the 2nd Q

Q. How is it in the 2nd Case?

A. The Word which denotes the acid ends in ous - as the Sulphurous acid - Nitrous acid &c -

Q. How are sulphites, Nitrites &c formed?

A. By the Combinations of these last

Q. How are oxygenated Murates, oxygenated Sulphates &c. formed?

A. By the Combination of the former?

Q, What is Chemistry?

A. It is a Science which teaches us the Nature and properties of Bodies.

Q, How many Methods are used to obtain this Knowledge?

A. Two, Analysis and Synthesis.

Q, How are the principal Operations of Chemistry performed?

A. In a place Called a Laboratory.

Q, How ought a Laboratory to be constructed?

A. It ought to be extensive and well aired. to prevent dangerous Vapours from remaining. 2nd it ought to be dry, to keep Iron Vessels from rusting. 3^d It ought to be furnished with all these Instruments

which may be employed in the Study
of the Nature of Bodies, and in en=
quiries respecting their properties.

2. How are those Instruments useful?

A. Some are of general Use and ap=
plicable to most Operations - others
serve only for peculiar uses. —

2. What are the Chemical Instru=
ments most frequently employed?

A. The Furnaces. —

2. Of what do these Furnaces consist?

A. Of Earthen Vessels appropriated
to the Various Operations performed
upon bodies by means of fire.

2. Of what are these Vessels formed?

A. A proper Mixture of Sand and
Clay. —

No 2

2. What has occasioned the Construction
of Furnaces in different forms?

A. The several methods of applying
fire to Substances under examination

2. What is meant by the evaporatory
Furnace?

A. It is used to reduce liquid Sub-
stances into Vapour by means of
heat. in order to separate the more
fixed principles from those which
are more ponderous:

2. How is the fire place covered?

A. By The evaporatory Vessel.

2. How are these Vessels formed?

A. Of Earth. Glass or Metal.

2. Which of these is to be preferred?

A. Glass — because it is the least liable to
be attacked, the least soluble &c.

2. How are evaporatory Vessels known?

A. By the Names of the Capsules or Cu-
cubits according to their several forms.

2. How ought these Vessels to be Constructed?

A. They ought to be very wide and shallow, - that the evaporation may be speedy and economical.

2. How ought it to be constructed in other respects -

A. 1. The evaporatory Vessel ought not to be narrow at its upper part -

2. The Heat should be applied to the liquid in all parts, and equally -

3. That the Column or Mass of the Liquid should have little depth, - and a large surface of evaporation -

How many ways may evaporation
be performed?

A. Three — 1, by a naked fire —
2, By the Sand Bath — 3 By the
Water Bath.

2. How is evaporation performed
by a naked fire?

A. When there is no substance inter-
posed between the fire and the
Vessel which contains the liquid
intended to be evaporated; as
when Water is boiling in a pot.

2. How is evaporation performed
by the Sand Bath?

A. By a Vessel filled with sand
being interposed between the fire
and the evaporatory Vessel.

2. What is its particular use?

A. The Heat is communicated
more slowly and gradually and

the Vessel less liable to be broken
by the gradual application of
heat - The Refrigeration is more
gradual - And the Operations
are performed with a greater
Degree of Order, precision, and
facility. —

Q. When is the evaporation said
to be on the Water-Bath?

A. When a Vessel of Water is made
use of and the evaporatory Vessel
is plunged in this liquid —

Q. When is this Method of evap-
oration employed?

A. When Certain principles of great
Volatility, such as Alcohol, or the
Aromatic Principles of plants
are to be extracted or distilled

Q. What Advantage does this Method possess?

A. It affords products which are not changed by the fire.

Q. Why so?

A. Because the Heat is transmitted to them by the intervention of a Liquid.

Q. Is it this Circumstance which renders the process Valuable for the extraction of Volatile Oils, perfumes, Ethereal Liquors &c.

A. Yes.

Q. How may this standard heat be graduated or varied at pleasure?

A. By adding Salts to the Liquid of the Water Bath. because this single Circumstance renders the Ebullition more or less quick and easy.

Q. How does Sublimation differ from evaporation?

A. Because the Substance to be raised is solid -

Q. What are the Vessels used in this Operation called?

A. Sublimatory Vessels.

Q. What Appearance have these Vessels?

A. They are commonly Globes terminating in a long Neck: they are then called Matrasses.

Q. How is sublimation Carried on?

A. A part of the ball of the Matraß is surrounded with Sand. The Matter is volatilized by the Heat, rises and is Condensed against the Coldest part of the Vessel; where it forms a Stratum or Cake, that may be

taken out by breaking the Vessel
itself. —

Q. Is it in this Manner that
Sal: Ammon: Corros: Sub:
and other similar products are
formed for the purposes of Commerce?

A. Yes. —

Q. For what purpose is Sublimation
usually performed?

A. For the purpose of purifying
Certain Substances, and disengaging
them from extraneous Matter. —

Q. For what other purpose?

A. To Reduce into Vapour, and
Combine under that form, principles
which would have united with
great Difficulty if they had not been
brought to that State of extreme
Division. —

2 What is meant by the Reverberatory Furnace?

A. That Construction which is appropriated to Distillation.

2, Of how many parts is this furnace composed? & The Ash

^{House}
A. The Ash-hole, intended for the free passage of the Air, and to receive the ashes or Residue of the Combustion. 2nd The fire place, separated by ~~from~~ the ash-hole by the grate, and in which the Combustible Matter is contained. 3rd A portion of a Cylinder, which is called the laboratory, because it is this part which receives the Retorts employed in the Operations of Distillations.

No 4

4 These three pieces are covered with a Dome, or portion of a sphere, pierced near its upper part by an aperture, which affords a free passage to the Current of air, and forms a Chimney.

Q, How may a Reverberatory furnace be well proportioned?

A. 1 The ash hole should be large to admit the air fresh and unaltered. - 2nd That the fore place and Laboratory together should have the form of a true Ellipsis, whose two foci should be occupied by the fire and the Retort. -

Q, What is meant by Distillation?

A. It is that process by which the force of fire is applied to disunite and separate the several principles

of bodies, according to the ~~Laws~~
of their Volatility, and their
several affinities. —

A.

Q. How are

Distilling Vessels ~~are~~ known by the

Name of Retorts —

the oval portion of the Retort, is called its Belly, is placed in the Laboratory of the furnace, and is supported upon two Bars of Iron, in separate the Laboratory from the fire place.

Q. What are Retorts formed?

A. Of Glass, Stone Ware, Porcelain
or of Metal —

Q. What is the form of Retorts?

A. This Figure Resembles an Egg
terminating in a Beak or Tube
which diminishes insensibly
in Diameter and is slightly
inclined or bended. —

Q. What is the Name of the Vessel
intended to Receive the product
of the Distillation and is fitted
to the Neck of the Retort —

A. The Recipient. —

2. What ~~is~~ kind of a Vessel is the Receiver?

A. It is commonly a Sphere with two Apertures; - the one large to Receive the Neck of the Retort: the other small to afford Vent for the Vapours.

2. What is this part Called?

A. The Tubulure of the Receiver.

2. May distillation be performed in any other way than by the Laboratory Furnace?

A. Yes on a sand Bath.

2. What is a forge Furnace?

A. It is that in which the Current of air is determined by Bellows.

2. For what is the Forge Furnace Employed?

A. For the fusion and Calcination of Metals and generally for all the Operations performed in Crucibles.

2. What is understood by Crucibles?

A. Vessels of Earth or Metal which are almost always of the form of an inverted Cone. The Hesse or Holland Crucible, the best.

2. What is the best Material to make crucibles with?

A. Platina.

2. What is the Agent of such Decompositions as are effected by means of furnaces?

A. Fire.

2. How is it afforded?

A. By the Combustion of Wood, pit-Coal or Charcoal.

2. Which is preferable in our Laboratory?

A. Charcoal — on account of its not smoking as much as wood.

Is it
2. ~~It~~ necessary to defend the ^{No 5}
Retort from the action of fire?

A. Yes

2. How is this done

A. By Coating it with a Mixture
of fat earth and fresh horse dung

2. How is this formed

A. It is properly moistened and
kneaded into a paste which
is to be applied and spread with
the hand upon every part of the
Retort. —

2. What Advantages does the horse
-dung Combine?

A. It Contains a serous fluid,
which hardens by heat, and strongly
Connects all the parts together.

2nd The filaments or Stalks of hay
are so easily distinguished in
horse Dung, unite all the parts
of the lute together.

2. How do you Oppose the escape
of Vapors?

A. By luting in the lute of lime
and the white of an egg. also
with fat lute made by boiling
Linseed oil mixed and well
incorporated with sifted clay.
and should be applied on old Linen round the
Places of Lining.

2. ~~The~~ Lute should not the lutes
be dry before the Application of
heat -

A. Yes.

2. How would you Retain with-
out Risk such Vapours as would

otherwise escape -

1. By the Apparatus known by the Name of its Author - Mr. Woulfe, an English Chemist. -

2. In what does his process consist?

1. In adapting the extremity of a Recurved Tube to the Tubulure of the Receiver; the other end of which is plunged into Water in a Bottle half filled and properly placed for that purpose. From the empty part of this Bottle issues a second Tube, which is in like Manner plunged in the Water of a second Bottle. a Number of other Bottles may be added, observing the same precautions; with the Attention, nevertheless, to leave the last open, to give a free escape to the Vapour, which is not coarcted: and when

the apparatus is thus disposed, all the joinings are to be luted. —

Q. Are not the most pure and concentrated products obtained by this means? — A. Yes.

Q. Why so?

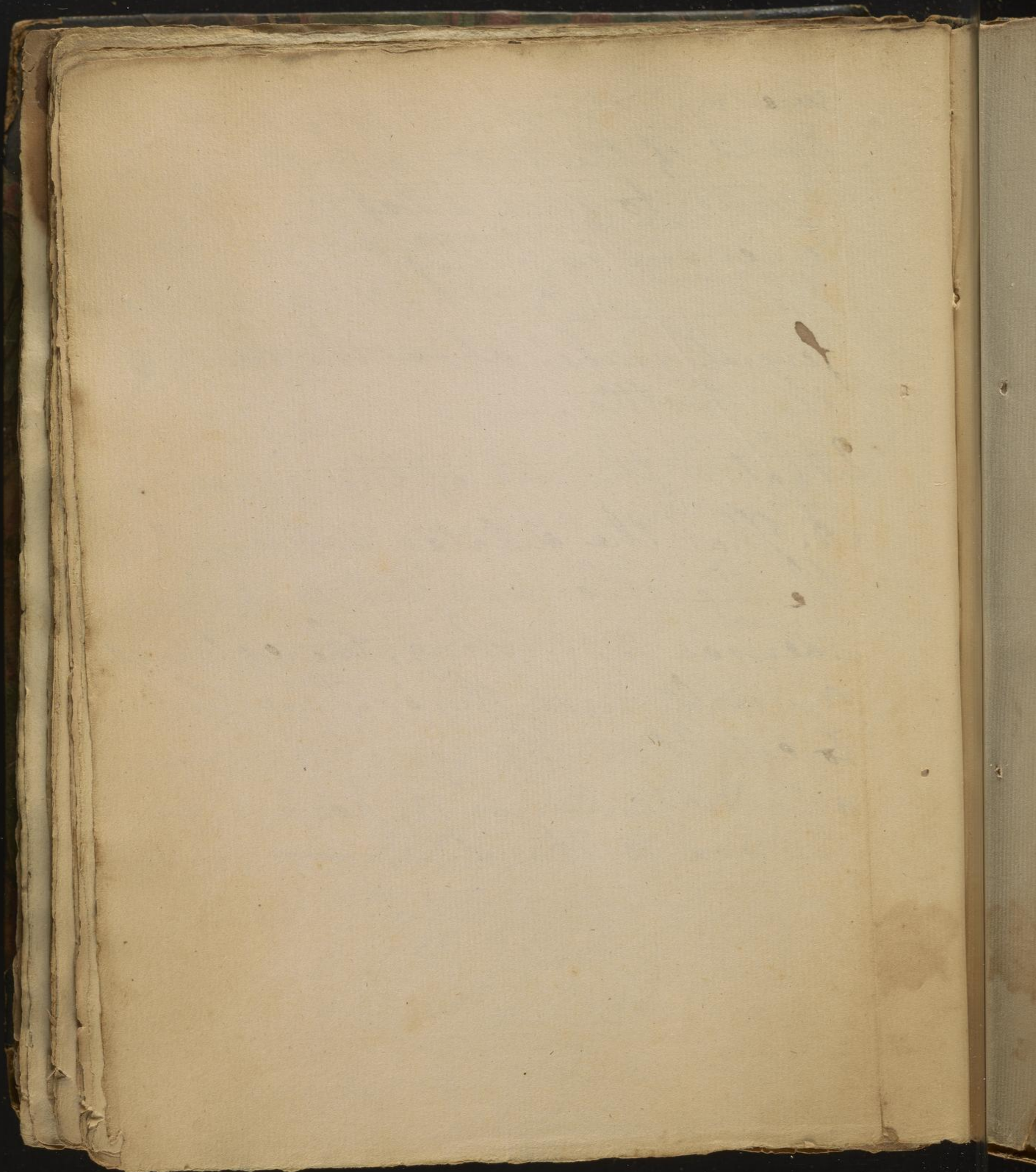
A. Because the Water which is always the Receiver, and is the Vehicle of these Substances, becomes saturated with them

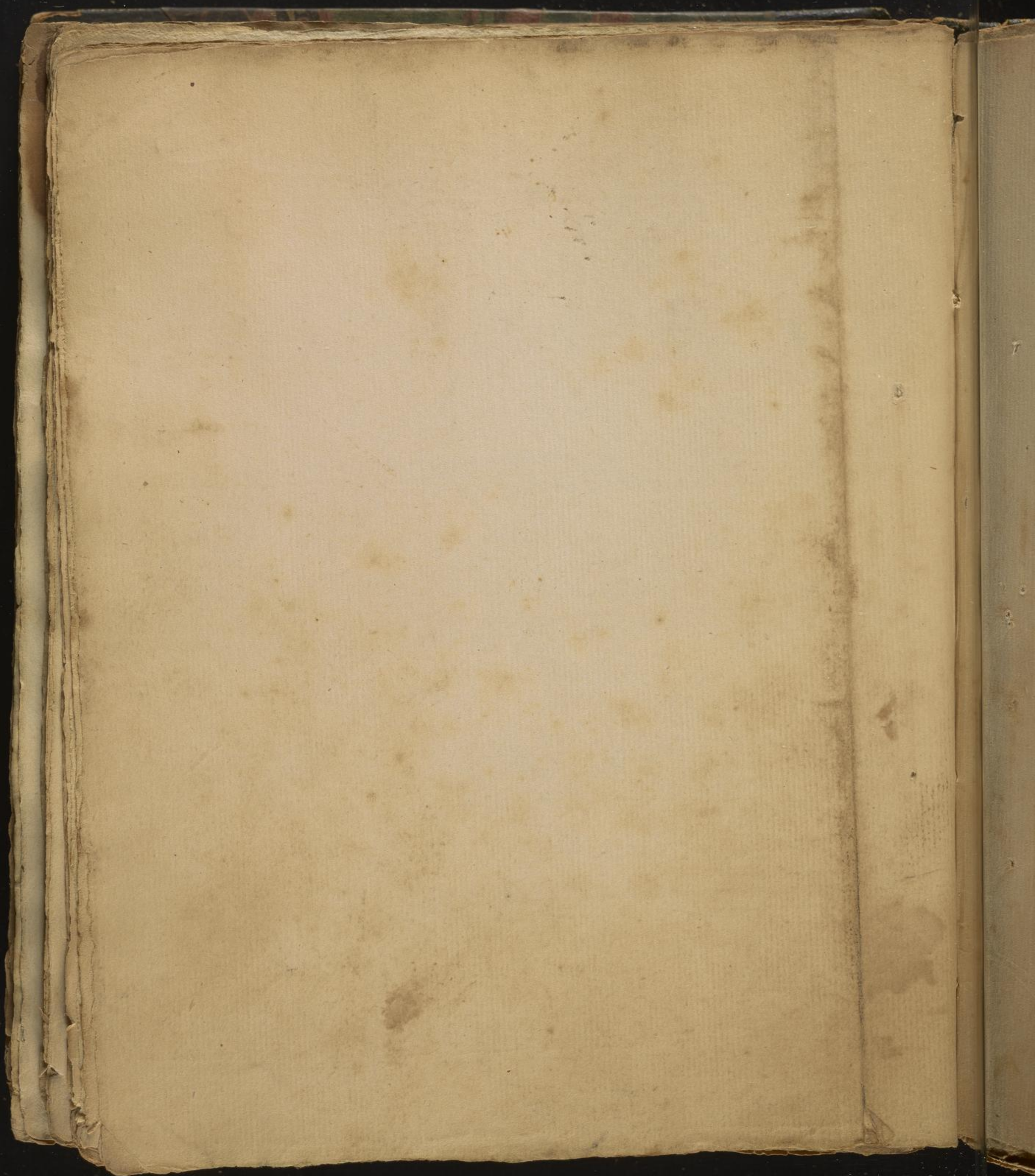
Q. Would it not often happen in this apparatus that the pressure of the external Air would cause the Water of the outer Vessel to pass into the Receiver in consequence of the simple Refrigeration of the Retort; this inconvenience has been obviated, by

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inserting a straight Tube into the
Necks of the first and the second
Bottles, to such a Depth, that its
lower end is plunged into the
Water, while its other end rises
several inches above the neck of
the Bottle. —

2. What is the use of this invention?

A. That the dilated Vapors of
the Receiver and Retort are con-
densed by Cooling, the external
Air will rush thro' these Tubes
to establish the equilibrium:
and Water cannot pass from
the one to the other. —





~~or Atmospheric~~ No 14

3. This Mephitic may be procured by treating Muscular flesh or the well washed fibrous part of the Blood with Nitric Acid in the hydro pneumatic Apparatus. — But it must be carefully observed that these Animal Matters ought to be fresh; for if they have begun to be changed by the putrid fermentation, they afford Carbonic Acid mixed with Hydrogene Gas — Is not

2. This Gas ~~is~~ improper for Respiration and Combustion?

A. Yes. — But Plants live in this Air and freely Vegetate in it.

2. Does not this Gas mix with the other Airs, without Combining with them? — A. Yes.

Q. Mines with Vital Air, in the proportion of 72 to 28 does it not constitute our Atmosphere?
A. Yes. — Section 6. ^{2. Is it not lighter than atmospheric air}

Concerning the Mixture of Nitrogene and oxygene Gas; or of Atmospheric Air. —

Q. Do the gaseous substances exist alone and insulated?

A. No, Nature presents them every where to our view in a state of Mixture or of Combination. —

^{Does not} Q. Nature in its several Decompositions Reduces almost all the principles of Bodies into Gas. —

A. Yes —

Q. Does not the mixture of about
72 parts of Nitrogen Gas and
28 of Oxygen, form this fluid
Mass in which we live?

Q. Is not Air a fluid of extreme
Rarefaction? A. Yes.

Q. Is it not invincible? A. Yes.

Q. Is it not inodorous? A. Yes.

Q. Is it not insipid? A. Yes.

Q. Is not Air elastic? A. Yes. —

Concerning the Combination of
Oxygenous Gas and Hydrogenous which
forms Water. —

Q. Is not Water formed of Oxygen and
Hydrogen Gas? A. Yes.

^{Water in a state of combination in Bodies}
Q. Do not Salts and most stony Crystals
lose their Transparency when they are
deprived of their Water of Crystallization?
A. Yes.

Q. Are not the acids indebted to Water for their fixity?

A. The acids acquire fixity only by combining with Water. —
Water may be considered as the general Cement of Nature.
Concerning Water in the State of Ice.

Q. ~~What~~ Does not Water passing to the Solid State produce Heat? A. Yes

Q. Does not slight agitation facilitate its Conversion into Ice?

A. Yes. —

Q. Does not frozen Water occupy a larger space than fluid Water?

A. Yes. —

Q. Does Ice appear to be any thing more than a Confused Crystallization?

A. No.

2. Does not Water when passing from the solid to the liquid State produce cold?

A. Yes, By the absorption of a portion of Heat.

2. Does not the Ice formed by Salt Water afford fresh Water when melted? A. Yes —

2. Hail and Snow are only Modifications of Ice? A. No more.

2. Is not Hail produced by the sudden disengagement of the elastic fluid, which concurs in rendering Water liquid: it is almost always accompanied with Thunder.

A. Yes —

The following fact will illustrate
it. On the 29th of October 1786,
four Inches of Water fell at Mont-
pelier; a Violent explosion of
thunder, which was heard about
four in the Evening, and which
appeared to be very near, caused
a most dreadful Shower of
hail. At this instant a Druggist
who was employed in his Cellar
in preventing the Mischief oc-
casioned by the filtration of
Water thro the Wall, was highly
astonished to behold the Water
which, Came thro the Wall
was instantly Changed into
Ice. — I Visited the place a
quarter of an hour Afterwards
and found 10 pounds of Ice at the foot of
the wall. —

Concerning Water in the liquid State.

Q. What appears to be the natural State of Water?

A. That of Ice, but its most usual State is that of fluidity.

Q. How is Water purified?

A. By Distillation.

Q. How is this operation performed?

A. In Vessels called Alembics

Q. How is the Alembic composed?

A. Of two pieces of Boilers or cucurbits, and a Covering called the Caputal or head.

Q. Is not Distillation more speedy and quick in proportion as the pressure of the Air is less upon the Surface of the Stagnant fluid.

2. Is it not in Consequence of these principles, that Mr. Richard Constructed an Instrument, to determine the Heights of Mountains by the degrees of Temperature of the Ebullition of boiling Water.

The Abbe Monger, and Mr. Lamanon, observed that ether evaporates with prodigious facility upon the peak of Teneriffe; And Mr. Defausure has confirmed these experiments on the Mountains of Switzerland.

2. Does not the Heat of the Sun Raise Water in the form of Vapours?

A. These remain a certain time in the Atmosphere, and afterwards fall in the form of Dew.

2. Does not this Rise and fall of humidity which succeed each other wash and purge the Atmosphere of all those particles, which by their Corruption or Development might render it infectious; A. Yes - and it is perhaps this ~~various~~ Combination of ^{various} Miasmata with water which renders the Evening Dew so un-
-wholesome.

2. Is it not to a similar natural Distillation that we ought to refer the Alternate transition of Water from the liquid State to that of Vapour, which forms Clouds, and by this Means Con-veys the Water from the Sea to the Summits of Mountains, from which it is precipitated in Torrents, to return again to the Common Receptacle.

2. Did not the first Navigators in the Islands of the Archipelago fill their pots with Salt Water, and receive the Vapour in Sponges placed over them. — Mr. Poissonier has exhibited a very well constructed apparatus to procure fresh Water at all times in abundance. —

2. Does not pure Water require to be agitated and Combined with the air of the Atmosphere, to render it wholesome. — A. Yes. hence No doubt, it is that Water immediately produced by melting Snow is unfit to drink.

2. What are the Characters of potable Water?

A. 1 A lively, fresh, and agreeable taste.

2 The Property of boiling readily, and also that of boiling pease, and other pulse. —

3. The Virtue of Dissolving Soap with
- out Curdling. -

Concerning Water in the State
of Gas. -

2. How is Water converted into Gas?

A. By passing thro' earthen vessel
ignited in the Fire according to
Priestley and Kirwan. -

2. When water is converted into the State
of Vapour, in its passage through an ignited
iron tube, the Iron becomes oxidized, and
Hydrogene is obtained in the State of
Gas. -

Concerning the Combinations of
Nitrogen Gas. 1 With Hydrogene Gas
2. With the earthy principles forming
the Alkalis.

2. What are the Characters of an Alkali?

A. An acid, viscid, burning taste. the

Property of converting Symp of Violets
green, but not the tincture of Turnsole, as
Certain Authors announce. -

The Virtue of forming Glafs. when
fused with Quartrous Substances.

The faculty of rendering Oils miscible
with Water; of effervescing in acids;
and of forming Neutral Salts with
all of them. —

Q. How are the Alkalis Divided?

A. Into fixed and volatile Alkalis.

Q. How are they distinguished?

A. By the smell.

Q. How many kinds of fixed Alkali
have hitherto been discovered?

A. 1. The Vegetable Alkali or Pot-ash

2. The Mineral Alkali or Soda. —

Concerning the Vegetable
Alkali, or Pot-ash.

Q. By what Name is the Alkali extracted
from the Lixivium of Wood-ashes
known? A. Salin. —

Q. What forms Pot-ash?

N^o 17

A. The Salin Calciné, and by this means disengaged from all the blackening principles. form Potash.

Q. How do you procure Salt of Tartar?

A. By burning a Mixture of equal parts of Nitrate of Pot-ash, or Common Nitre and Tartar.

Q. Is not the lees of Wine totally converted into alkali by Combustion?

A. Yes and is called Candor, Grave-lees.

Q. Does not the Combustion of Tartar of Wine afford an Alkali of considerable purity? A Yes.

Concerning the Mineral alkali, or Soda.

Q. How is the Mineral alkali obtained?

A. From Marine plants by Combustion.

the Mineral alkali differs from the Vegetables because
it is less caustic. 2. It does not attract humidity
it is more proper for vitification

The Banilla of Spain affords
the beautiful Soda oflicant.

Q. Is not the Mineral Alkali
sometimes found in a Native
State in Egypt. A. Yes, and
is known by the Name of Natron.

Q. What is this Alkali Called
when evaporated and brought into
the dry form? A. The Caustic
Alkali —

Q. Are not the Solutions of Sulphur
in Alkali known by the Name
of Lives of Sulphur, — A. Yes.

Q. Do not these Sulphures or Hepars
dissolve Metals?

A. Yes, Gold itself may be so Dissolved
by this Means as to pass thro' Filters.

Stahl has supposed that Moses made
use of this Method to enable the Israelites
to drink the Golden Calb.

Q. Is it not probable that Nitrogen Gas is one of the principles of Alkali?
Yes. this Gas combined with Lime, forms Pot-ash while its union to Magnesia forms Soda. —
Concerning Ammoniac,

On
The Volatile Alkali

Q. How is the Volatile Alkali formed?

A. By the decomposition of Sal ammoniac —

Q. How is Ammoniac obtained in a state of Considerable purity?

A. Equal parts of sifted quick-lime and muriate of Ammoniac or common Sal ammoniac in Powder are mixed. This Mixture is introduced into a Retort to which a Receiver have been adapted a Quantity of pure Water is to be put into the Bottles corresponding to the weight of the Salt employed: and the Joints luted &c.

The Ammoniac is engaged in the
State of Gas, at the first impression
of the Fire — It combines
with the Water with heat; and
when the water of the first bottle
is saturated, the Gas passes to
that of the second and saturates
it in its turn. —

Q. Is not this alkali a Compound
of the Nitrogen and hydrogen Gases

A. Yes.

Concerning the Combination
of Oxygen with Certain Bases forming
Acids. —

Q. What are acids?

A. Combinations of Vital Air with
a certain elementary Substance.

Q. What are the Properties of acids?

A. 1st Sourness

A second property is that of changing certain blue vegetable colours into Red, such as the Symp of Violets &c. —

3rd Property they effervesce with alkalis; But this property is not general. —

Concerning the carbonic Acid, or Fixed Air, or Nephritic acid, Cretaceous Acid &c. —

2. How is the Carbonic Acid formed?
A. Of oxygen and pure charcoal.

2. Is not the acid carbonic found in three States?

A. Yes in a State of mixture, in a State of Gas and 3rd In a State of Combination.

2. Where is it found in the State of Gas?

A. At the Grotto del Cano near Naples. at the Well of Perols, near Montpellier;

upon the Surface of Lake Averno
in Italy - in various subterraneous
places, such as Tombs, Cellars,
Necessaries &c. - It is disengaged
in this form by the Decomposition
of Vegetables heaped together, by
the fermentation of Wine or Beer,
by the putrefaction of Animal
Matters &c.

Q. Does it not exist in a State of
Simple Mixture in Mineral
Waters? A. Yes. in these it
possesses all its acid properties.

Q. Does it not exist in a State of
Combination in Stone, Common
Magnesia, Alkalies, &c. - A. Yes.

Q. How is it proved to be acid?

2. When the Carbonic Acid exists in a state of Gas how is it collected?

A. By filling a Bottle with Water and emptying it in the atmosphere of this Gas. the Acid takes the place of the water and the Bottle is afterwards corked to retain it.

2. When it exists in a state of Combination how may it be extracted?

A. By Distillation with strong heat.

2. When it exists in the state of Simple Mixture as in Water - Wine &c.

A. By Agitation of the Liquor in contains it.

of turnsole
ol. alk &c.
it is strongly

properties?
piration.

slaves which
and into
who were

tation -

ily dissolved

the following
bonic Acid is
ne, or pure

upon the Soil
in Italy -
places, such
Necessaries
in the form
of Vegetables
the farmer
by the price
Matters

2. Does it in
Simple Mix
Waters? &
possesses all

2. Does it not
combination
Magnesia, also

2. How is it

A. It turns the Tincture of turnsole
Red — 2 It neutralises Vol: Alk &c.
3 Water impregnated with it is strongly
subacid — &c —

Q. What are its properties?

A. It is unfit for Respiration.
as was proved by two Slaves which
Liberius ordered to descend into
the Grotto del Canis — who were
immediately stifled —

2. It is unfit for Vegetation —

3^d The carbonic Acid is easily dissolved
in Water. —

Q. ~~Is not~~ It is proved by the following
experiment that the carbonic Acid is
a combination of carbone, or pure
Charcoal, and oxygene —

1. The oxides of Mercury, when distilled, are reducible without addition, and afford only origenuous Gas; but if only a small quantity of charcoal be mixed with the oxide, the product which comes over consists of carbonic gas only, and the weight of the charcoal is diminished.

2. Do not the alkalis contain Carbonic Acid?

A. Yes and it is this acid which modifies them, and diminishes their energy, at the same time that it communicates to them the Property of effervescing.

2. May we not Consider Alkalis as Carbonates with excess of Alkali?

A. Yes, and it is easy to saturate this superabundant alkali and to form true Crystallizable Neut. Salts.

The Hygros Pneumatic Apparatus consists of a Wooden Box of a Square form lined with Lead. - 2 or 3 Inches beneath the upper edge there is a Groove in which a Wooden plank slides having a hole in the middle and a No. 10 bit in one of its sides. The hole is made in the center of an excavation made in the shelf, of the figure of a funnel - This Vessel is filled with water or a Mercury according to the Nature of the Gases operated on.

The Gases may be extracted in various ways when they are disengaged by fire a Receiver Tube is adapted to the neck of the Retort one extremity of which is plunged in the water or the Mercury of the Hygros

Pneumatic Apparatus and opens beneath the aperture in the shelf which is in the form of a funnel

19
Li
2
tan=
Holds

The Junction of the tube with the
1. Neck of the Retort is secured with the
usual lute, a vessel filled with the
are liquid of the Cistern is inverted upon
an the shelf over the aperture. When the
but Gas is disengaged from the Materials
in the Retort, it appears in the form
of Bubbles, which rise and gain the
superior part of the inverted vessel.
When all the Water is displaced,
and the Bottle is full of Gas it is
withdrawn by adapting a glass
plate to its orifice to prevent its
Dissipation: it may then be
poured from one vessel to another,
and subjected to a Variety of
Experiments to ascertain its Nature.

When the Gases are disengaged by
the means of Acids, the Mixture designed
to afford them is put into a Bottle with
a curved Tube fitted to its Neck
2. and this Tube is plunged in the Cistern
in such a Manner that the Bubbles of
Gas may pass as in the former Experiment
A. Gas this the aperture of the funnel in the shelf.

of Pot-ash (19)

is Tartar—

Salt of Tartar
Caustic, and of
the otherwise—

nate of Soda or
alkali, Emeticous

of Ammoniac
or
Volatile alkali

it be obtained?

any animal Substance
distillation. Tobacco affords
portion. Ashes

ay it be obtained?
ing white chalk

The Junction
1. Neck of the Retort
are usual late, a
are liquored of the Co.
and the shelf over
but Gas is disengag
in the Retort,
of Bubbles, w
superior part
When all the
and the Bottle
withdrawn
plate to its
Disipation:
formed from
and subjected
Experiments to
when the Gases are
Means of Acids the
to afford them is put in
a curved Tube fit
2. and this Tube is placed
in such a Manner that
Gas may pass as in
this the aperture of the funnel

Carbonate of Pot-ash (19)

or
Cretaceous Tartar—

It is Superior to Salt of Tartar
by being less Caustic, and of
the same Virtue otherwise.—

Carbonate of Soda or
Aerated Mineral alkali, Cretaceous
Soda &c.—

Carbonate of Ammoniac

or
Concrete Volatile alkali

Q. How may it be obtained?

A. From many animal Substan-
ces by Distillation. Tobacco affords
a large proportion. Also

Q. How may it be obtained?

A. By mixing white Chalk

with equal parts of Muriate of
Ammonia, or Common Sal. Amm.
the Mixture is put in a Retort
and Distilled - The Ammoniac
and Carbonic acids being
disengaged from their Bases
and Reduced into Vapours
Combine together and are deposited
on the sides of the Receiver, where
they form a Stratum more or
less thick.

Concerning the Sulphuric Acid
Q. How is it made?
A. It is made by the Combustion of
Sulphur ~~or~~ by Oxigenous Gas?
it is performed in large Chambers
lined with lead. The Combustion
is facilitated by mixing about
one eighth of a Nitrate of Pot-ash

with the Sulphur - The Acid Vapours
which fill the Chamber are pre-
cipitated against Sides - and
the Condensation is facilitated
by a Stratum of Water dis-
posed on the Bottom of the
Chamber. When the Water is
sufficiently impregnated with
Acid, it is Concentrated in
lead en Boilers, and Rectified
in Glass Retorts, to render
it white, and to Concentrate
~~it in lead en Boilers~~ it
sufficiently for the purposes
of Trade. -

Q. Is the Sulphuric Acid Capable
of passing to the Concrete State by
the impression of intense Cold?
A. Yes.

2. What are the Characters of the Sulphuric Acid?

A. 1 It is unctuous and fat to the Touch -

2. It weighs 1 ounce and 7 gros in a Bottle containing one ounce of Distilled Water

3 It produces Heat when mixed with Water, to such a Degree as to exceed that of boiling Water.

4 It ferres with great avidity all inflammable Substances.

20

Sulphate of Pot-ash
or
Vitriolated Tartar. —
Vitriol of Pot-ash &c.

Sulphat of Soda
or
Glauber's Salt —

It is also obtain'd from the tamarix
gallica, which grows on the Sea
Coasts, Contains so large a Quantity
that it may be extracted to ad-
vantage. Nothing more is necessary
for this purpose, than to burn
the Plant and lixiviate the
Ashes.

Sulphat. of Ammoniac
or
Glauber's secret Ammoniacal Salt

Concerning the Nitric
Acid. . or Aqua fortis

2. How is it formed?

A. By mixing one part of Saltpetre with two or three parts of red Colar Earth. This Mixture is put into Coated Retorts, disposed in a long Gallery or long furnace, to each of which is adapted a Receiver. The first Vapour which arises in the Distillation is nothing but Water, which is suffered to escape at the place of Juncture, before the luting: and when the red Vapours begin to appear, the Phlegm which is condensed in the Receiver is poured out; and the Receiver being replaced, is carefully luted

to the Neck of the Retort. The Vapours
which are condensed, form at first
a greenish Liquor: This colour
disappears insensibly, and is repla-
-ced by another which is more
or less yellow.

Q. ~~Does~~ Is it not the property which
Nitrous Gas possesses, of absorbing
Oxygen to form the Nitric Acid,
which has caused it to be employed to de-
-termine the proportion of oxygen
in the composition which forms
our Atmosphere.

A. Yes, The Abbe Fontana has con-
-structed on these principles an
ingenious Eudiometer, The Descrip-
-tion and Manner of using which
may be seen in the first Volume
of Dr Ingenhousz's Experiments upon
Vegetables 144

Nitrate of Pot-ash—

Q. How is it formed?

A. By a combination of Nitric Acid & Pot ash.

In the Indies it effloresces on the surface of uncultivated ground—

Saltpetre is extracted in France from the Ruins and Plaster of old Houses. —

It exists ready formed in Vegetables, such as Parietaria and Bugloss &c —

Q. How are the Saltpetre Beds formed?

A. With Lime, ashes, earth of uncultivated ground and straw which are stratified, and watered with Urine, Dung-hill Water and Mother Waters. —

Mr. Thouvenel has proved that ^{the} Gas, which is disengaged by putrefaction, is necessary for the formation of Nitric Acid. That, and next to it, Urine, were the Animal parts which were most favorable to its formation;

2. Is it not necessary in order to establish artificial Nitric Acid that animal putrefaction and Vegetable fermentation should concur. A. Yes. —

The Nitrogen Gas, in its disengagement from the Animal Substance, — Combines with the Oxygen, and forms the acid, which again unites with the Alkali, whose formation is favored by the Vegetable Decomposition. —

2. How is it Clarified?

A. It is dissolved in fresh Water which is evaporated, and to which Bullocks Blood may be added to Clarify the solution. —

2. Is not Charcoal fusible upon ignited coals?

A. Yes, and in this case its Acid is decomposed? The Oxygen unites with the Carbon and forms the Carbonic Acid.

2. In the Distillation of the Nitrate of Pot-ash what Quantity of oxygenous Gas does each pound of the Salt afford?

A. 12000 Cubic Inches. —

When a mixture of equal parts
of Nitre and Sulphur are thrown
into a red hot Crucible, a Saline
Substance is obtained called
Sal Polychrest. of Glasses

2. How is Gun Powder formed?
A By a Mixture of 75 parts
of Nitre - $9\frac{1}{2}$ of Sulphur
and $15\frac{1}{2}$ of Charcoal. —

It is triturated by Pounding Mills,
Then Granulated thro' Sieves of
Skin - Powder is afterwards
Glazed for fowling - by putting
it into a Cask which turns
on its Axis

The Mixture and trituration of 3 parts of
Nitre 2 of Salt of Tartar and one of
Charcoal, the same effects will now

Nitrate of Soda.

Nitrate of Ammonia

Concerning the Muriatic acid

Q. How is it obtained?

A. By a Process little differing from
that which is used in the extraction
of aqua fortis — The ~~then~~ Sulphuric
acid is generally made use of to
decompose the Marine Salt.
The Originated Muriatic Acid.

It is applied to the whitening of Paper
and old Prints. — Common Ink dis-
appears by the action of this acid —
But Printers Ink is not attacked
by it —

Q. Will it not convert Sulphur
into Sulphuric Acid,? A. Yes.

Q. Does it not deprive the very black
Sulphuric acid of its colour?

A. Yes.

Muriate of Pot. ash.

Febrifuge ^{or} Salt of Sylvius

It is found in the ashes of Tobacco. —

Muriate of Soda

Marine Salt — Common Salt

2. How is it formed?

Ans. It is found native in Cata-
lonia, Calabria, Switzerland,
Hungary, and Tyrol —

Marine Salt is so abundant in
Egypt, that, according to Haseelgus
a fresh Water Spring is a Treasure
which is secretly transmitted
from Father to Son. —

In Cold Climates, Salt Water is concentrated by
freezing.

2 at the Salt Spring of Sorraia is pumped
upon heaps of Thorns ^{to evaporate it and cause it to}
vulpner, ^{the further Concentration} is effected in Boilers

anytes decomposes Marine Salt — So does the
Vegetable Acids combined with Lead. —

Muriate of Ammoniac

or
Sal Ammoniac

2. How is it obtained?

A. By Distillation from Soot.

and by the combustion of the
excrements of such animals
as feed on Saline Plants. —

Distilling Vessels were charged
with the Soot of the Excrements
of Oxen, to which Sea Salt
and Camels Urine were added.

(The latter part of the
process is not accurate)

2. How is the Sublimation per-
formed? A. In large round
Bottles of $1\frac{1}{2}$ feet Diameter

terminating in a Neck of two Inches in height; and they are filled to within four inches of the Neck. The fire is kept up during three times 24 hours. The salt is sublimed to the upper part of these Vessels where it forms a Mass of the same figure as the Vessels themselves. 20 lbs. of Soot afford 6 lbs. of Sal Ammoniac.

Q. Is it ^{it} not found sublimed thro' the Apertures of Volcanic Mountains?
A. Yes —

Q. Is it not also produced in the human Body, and exhaled by perspiration in Malignant Fevers — A. Yes

Q. Is it not used in Soldering? A.

Yes. in which Operation it possesses the Double Advantage of Clearing the metallic Surface and preventing its oxidation.

Concerning the
Nitro Muriatic Acid

or
Aqua Regia. is Name
it acquired on account of its
property of Dissolving Gold.

2. How is it formed?

It is By Distilling 2 Oz Common
Salt with 4 Oz Nitric Acid.

Sal Ammon is produced in the
human Body, and exhaled by perspiration
Mr Model in his own person after
a violent sweat which terminated
a Malignant fever he washed his
hands in a Solution of pot-ash
and observed that a prodigious
Quantity of alkaline Gas was
disengaged. —

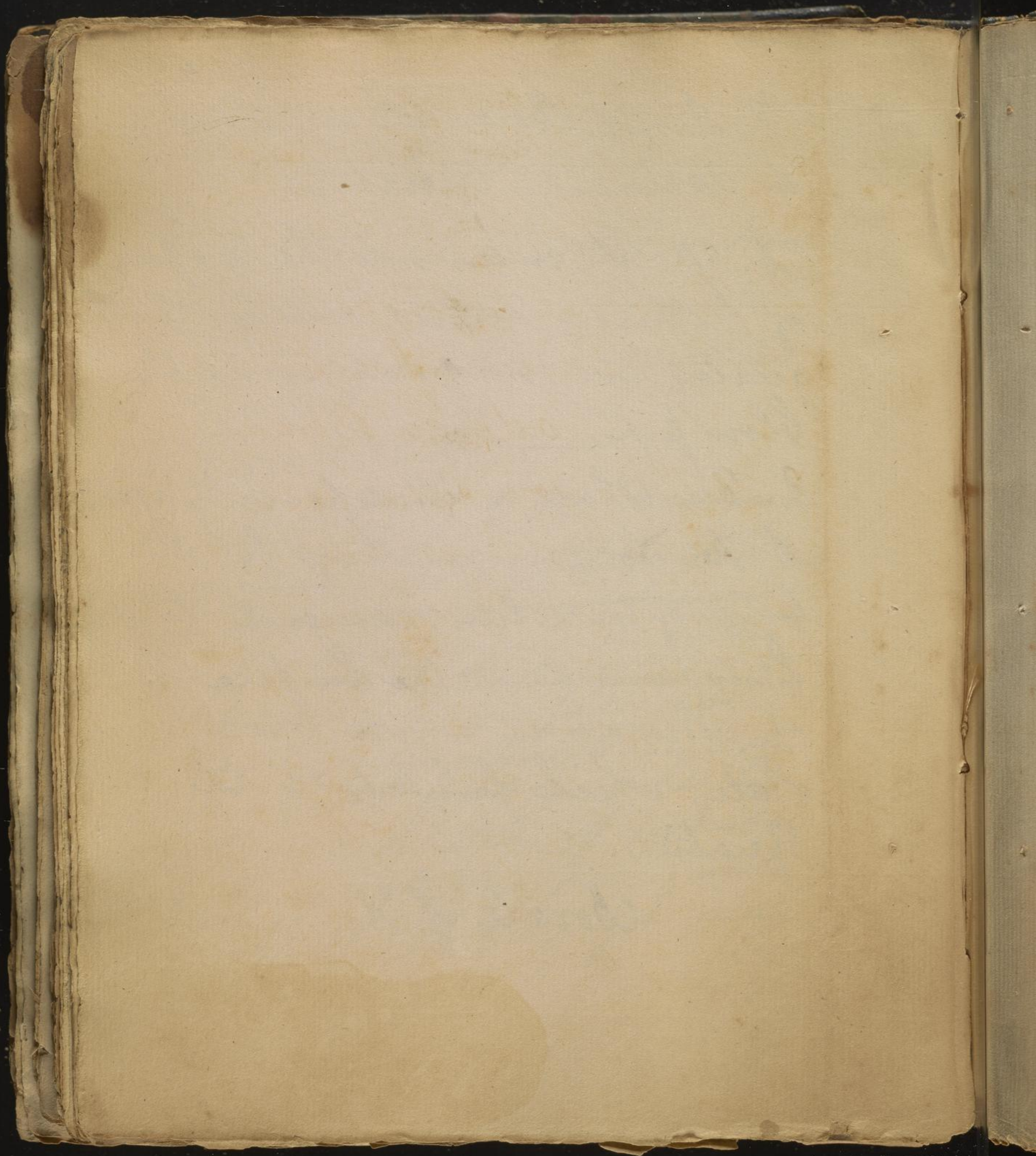
Q. Is not Borax an excellent flux
in docimastic Operations?

A. Yes it enters into the Composition
of Reducing Fluxes, and is of the
greatest use in analysis by the
blow pipe. —

Q. For what is it especially used?

A. For Soldering — it assists the
fusion of the Solder, causes it to
flow, and keeps the Surface of
the Metals in a soft Clean
State, which facilitates the
Operation.

Borate of Ammonia.



Concerning the
Acid of Borax.

Hornberg's ^{or} Sedative Salt

2. How is it afforded?

A By the Decomposition of the
Borate of Soda - or Borax.

2. How do you extract the acid
of Borax by Crystallization?

A. The Borax is dissolved in hot
Water, and an excess of sulphuric
acid is poured in. A Salt
is deposited during the Boiling
on the Side of the Vessel in
the form of thin round plates
applied one upon another.

Borate of Potash

Borate of Soda.
or Borax.

Q. How is obtained?

A It is dug up in a Crystalline
= fixed State from the Bottom of
Certain Salt Lakes, in a mountainous, barren, volcanic
= district, about 25 Days Journey
to the Eastward of Lassa the
Capital of the Kingdom of
Thibet. —

Q. How many States do you find
Borax in Commerce?

A Three — Brute, Borax. Tincal
and Chrysocola.

It converts Syrup of Violets to a green, —

Concerning Metallic Substances.

Introduction.

Q. How are metallic Substances distinguished from all the other productions of our globe? —

A. By a much greater Gravity and a Degree of Brilliancy peculiar to Bodies of this Class. —

1. One of the most distinctive Characters of Metals is their Opacity —

2. They are Ductile

A. Q. — Does not a thin covering of Tin & Mercury fixed on the Surface of a Glass form a Mirror or Looking Glass — well polished Steel forms the Mirror of Telescopes. —

2. How do you examine Minerals or Aqueous ones? —

A. By Pounding and transferring them in Crucibles.

3 Arsenic and Nitre, in equal parts,
form likewise a very active flux -
2. In how many States is the Mineral
found?

A. Three - 1 In the form of a native
Metal - 2 In the form of
Calx or oxide - 3rd Combined
with Sulphur or Arsenic.

2. Do not most Metals kept in a
State of fusion, lose their Metallic
brilliance, and ~~become~~?

A. Yes and become converted into
an opaque powder called Oxide -
or Metallic Calx -

3. Do not Metals oxidized in an
Atmosphere of oxygenous Gas absorb
it to the last drop - A, Yes -

2. How are Metals to be distinguished
A. Into those that are ductile
and those that do not possess
that property - The Name of
Metal has been applied to
the former and that of
Semi-metal to the latter -

Arsenic

Is a semi-metal of a glittering
Whiteness - of a somewhat vitreous
appearance, exciting an impression
of an acid taste on the Tongue.

Arsenic is found in friable
Masses possessing scarcely any
Consistence - It comes from
Bohemia & Germany &c -

It emits on burning a very
evident Smell of Garlic -

2. When the oxide of Arsenic
Combines with Sulphur what
is the Result? -

A. Either Orpiment or Realgar.

Realgar is Common in China
and is made into Vases - Pagods,
&c. -

Mr. Macquer has given us two
processes to obtain this Arsenical
acid -

Arsenic is used by the Dyers -

Orpiment & Realgar very much used
by Painters -

2. What is a direct Counterpoison

A. Mr. Savier proposed one dram
of Sulphur of Pot. ash or Liver of Sulphur
to be dissolved in a pint of Water.
which the Patient is directed to drink

No 2

Concerning Cobalt.

A Luminetal employed by Artists
to give a Blue colour to Glass
&c — it is of a light grey color,
Compact and brittle. The Nitric
acid dissolves it with effervescence

Concern Nickel

Henckel considered it as a Species
of Cobalt, or Arsenic mixed with
Copper —

The Muriatic acid dissolves Nickel

Bismuth or Tin Glass —

A Luminetal of a yellowish white
it ^{has} some Analogy with Lead — found
in Saxony —

The various Solutions of white
of Bismuth form Sympathetic
Inks —

Antimony

Is a Semi-metal —

Q. Has not this Substance singularly
engaged the Attention of Alchemists

A. Yes, They Considered it as the
Basis of their great Work —
and is described in their Writings,
under the Name of the Radical
Principle of Metals, Sacred Lead &c.

Q. In how many States is it found
in the Bowels of the Earth?

A 4. 1 In of Metallic form
2 Combined with Arsenic
3 Mineralized with Sulphur
4. In the State of Oxide.
Ore of Antimony has been found in
Several parts of France —

Antimoniated Tartrite of Potash
formed of the Acid of Tartar and
Antimony—

2. What is the most accurate process
for making an Excellent emetic?

A. It consists in taking very fine
transparent Glass of Antimony
grinding it fine, and boiling it
in Water, with an equal weight of
Cream of Tartar, untill the Salt
is saturated. — By filtration, and
evaporation with a gentle heat, and
subsequent Repose, Crystals of the
Antimoniated Tartrite of Potash are
obtained whose degree of Emeticity
appears to be sufficiently Constant.

2. What decomposes the Alkalis and
Lime? — The Antimoniated Tartrite
of Potash —

2. What Forms the Heimes Mineral?

A. Antimony dissolved in the Sulphureo
of Alkali.

Concerning Zinc.

Is a metallic Substance of a
bluish Brilliant white color.

Zinc is an intermediate Substance
between Semimetals and Metals.

Sulphate of Zinc or White Vitriol.

~~Ques~~ 2. What forms Lapis Calaminaris?

A. It is an Oxide of Zinc.

2. What is meant by the Flower of Zinc?

A The sublimed oxide of Zinc.

a Powerful Antispasmodic

It may be administered in pills

in the dose of one grain.

W. D. Moreau has substituted the precipitate
of Zinc to white Lead in of greatest advantage.

3

Concerning Manganese

A Mineral of a grey or blackish color, soiling the fingers and used in glass houses under the Name of Soap of the glass-makers —

The oxides of Manganese afford a great Quantity of oxygenous Gas. —

2. Does not the Muriatic Acid dissolve Manganese?

A. Yes, but when it is digested upon the oxide it seizes the oxygen, and passes in Vapour thro' the Water — This Vapour is known by the Name of oxygenated Muriatic Acid.

The Muriatic Acid dissolves Manganese —

Manganese is used to color glass and Porcelain of a Violet colour. —

Concerning Lead

Lead is the softest, the least tenacious,
the least fusible, the least elastic
and one of the most ponderous
of Metals —

1 White Lead ore
Green Lead ore
Black ore of Lead —

The oxides of Lead
urged by a stronger
heat are converted
into a yellow glass
so very fusible that
it penetrates & destroys
the best crucibles
It is used in glass houses

Red Lead - found in Siberia
Mr. Clap has considered this lead
ore as a variety of the preceding
Species coloured by Iron.

2. How is the Silver disengaged which
the Lead may contain —

A. It is carried to the Refining
furnace; where by the united
Energy of the fire, and the Wind of
Belows directed upon the melted Lead
the Metal is converted into a yellow
scaly oxide called Litharge. —

this charge is driven off in proportion as it fairs
and the Silver remains alone in the middle of the
Cupel. it is distinguished by a charge of Gold and
a charge of Silver.
lime and Alkali decompose it.

The acetic Acid corrodes Lead
and affords a white oxide by the
Name of white Lead. —

The Solution of Acetat. of Lead ~~and~~
~~is~~ ~~concentrated~~ ~~and~~ ~~Duly~~ Concentrated
Crystallizes in efflorescent ~~tetrahed-~~
rhal prisms; and forms the Salt
of Saturn, or Sugar of Lead. —

Lead ore is used to Glaze Pottery.
Concerning Tin.

It is a Metal of a white colour
intermediate between that of Lead
and Silver.

T, Pure Tin, Such as that of Malacca,
Banco, and the soft Tin of England. —
When the oxide is white, it is then
called Putty. —

The Drops of Tin may be made good
by heating it in contact with
Charcoal. —

The originated Muriatic Acid dissolves
Tin speedily;

The summing Liquor of Sibavius
is said to be a Muriate of Tin. —

The Solution of Tin which constitutes
the Composition for Scarlet, is made
with the Common Aqua fortis —
prepared with Salt-petre of the
first Boiling —

The Amalgam for electrical Machines
Composed of

2 parts of Mercury
1 of Zinc
1 of Tin —

The Zinc and Tin to be fused, and
minced with Mercury, The Mixture
agitated in a Wooden Beere.

of sulphur in a glass mortar
the weight of sulphur is 10 grains
these 10 grains of sulphur are
Cinnabar, or the red sulphur

to make a very fine red precip-
itate the Mercurial Solution
must be put into a Retort and
distilled until no more Vapor
come over. an additional
Quantity of Nitric Acid must
then be poured on the Residue
and also distilled after 3 or 4
Repeated Distillations a very
beautiful precipitate is
formed in small Crystals
of a superb Red Colour.

The Solution of Mercurial
Vitriol is ~~of use~~ form mer-
curial Water. it is of use to
ascertain the presence of Sulphuric
and mercurial Salts in Mineral
Waters. The Acids, The Alkalis
The Earths and some Metals
likewise precipitate Mercury from
its Solution in the Nitric Acid.

Mercurius dulcis may likewise be
Made by decomposing Mercurial
Water by a solution of the Mineral
of Soda. the white precipitate
which is obtained may be sub-
limed and forms an excellent
Mercurius dulcis.

Alia

14 pt. Corrosive Mineral of
of Mercury are triturated in a
Mortar to that of running
Mercury. When the Mercury
has disappeared, the texture
is put into Phials, and
sublimed three successive times
in order that the Combination
may be more accurate.
This Sublimate differs from the
Corros. Sub. by its insolubility
in Water, its insipidity and the
form of its Crystals. Whenever
it is suspected that Mercurius dulcis
still retains a portion of Corrosive

Sublimate with more is necessary to be done than to
triturate it and from holding Water on it

^{N^o 4}
internally rubbed with Chalk the
Mass is then to be reduced to a fine
Powder; and employed in that
State, or mixed with grease. —

~~The off~~

The Amalgam of Tin is used
to silver looking Glasses. for
this purpose, a leaf of Tin is spread
out upon a Table of the size of the
Glass, Mercury is poured upon it,
and spread about with a Brush.
This being done, a larger Quantity
of Mercury is poured upon the
Tin, so as to form a covering
of more than one line in
thickness. — The Glass is placed
upon this covering, by presenting
one of its Edges. — and
weights put on it. —

Concerning Iron.

Iron is the most generally diffused metal in Nature. — Almost every Mineral Substance of this Globe is Coloured with it — and its various alterations produce that truly astonishing Variety of Colors ^{as an comprehensive} ~~between the deep~~ ^{blue and deepest red.} 2. Is there not reason to think that the Magnetic Agent is a Modification of the Electric power?

A. Yes — 1. Iron which remains a long time in an elevated position becomes Magnetic. 2. Instruments of Iron struck with lightning are usually Magnetized. 3. Two pieces of Iron may be magnetized by rubbing them together in the same direction.

Concerning Sulphurous Iron Ore, or the Sulphure of Iron.

Iron is found in Mines. It is sometimes found Native

Concerning the Spathose Iron Ores
or Carbonates of Iron. —

Concerning the Bog Ores of Iron,
or
Argillaceous Iron Ores.

Art. V

Prussiate of Iron
or
Native Prussian blue

Art. VI

Concerning Plumbago, or the Carbure
of Iron. —

It is that shining Substance of
a blackish blue colour, which is used
to make the pencils called black
lead-pencils. — It is used to prevent
Iron from rusting or other Metals.
Plumbago is formed by the ligneous and
truly indecomposable part of the Wood
which resists the destructive action of
water in its Decomposition of Vegetable
Substances. —

Oxygen and Carbon exist in
Crude Iron -

Steel is a kind of Iron which
Contains Carbon only -

If Coaly Substances be combined
with Iron in a ductile State and
deprived of all foreign Matter,
the Combination being effected
by a cementation or otherwise, the
Iron will pass to the State of
Steel; and the Qualities of this
Steel will vary according to
the proportions of Carbon.

1. How is Siderite obtained

A. By Dissolving Iron in
Nitric Acid

2. Of What does the Basis of Ink

Consist - A. A Solution of Iron by
the Gallic Acid. -

Iron, dissolved by the prussic acid, forms Prussian blue, or the prussiate of Iron. -

2. How is the Prussic acid obtained?

A. By treating Prussian Blue by way of Distillation with the sulphuric acid it permits a fluid to escape that holds the prussic acid in solution it may be precipitated upon Iron. -

2. What Substance has been as the most accurate to ascertain the presence of Iron in any mineral Water?

A. The Prussiate of Lime. -

2. Does not the exposure of Iron to a humid Atmosphere rust it speedily, and cause it to pass to the state of aperitive Saffron of Mars. This preparation is a true Carbonate of Iron.

Concerning Copper.

It is a reddish metal hard, elastic,
its Taste Styptic, and, nauseous.

It is found in various forms —
in the Bowels of the Earth —

1 Native Copper —

Sulphat of Copper or blue Vitriol —

The acetic Acid forms Verdigris —

Vinegar distilled on Manganese dissolves
Copper; which proves that it has
taken up oxygen.

The Acetic Acid, or Radical Vinegar
differs from ordinary Vinegar, in
Containing a greater quantity of oxygen.

Concerning Mercury.

The It differs from all other Metals,
by its property of "retaining the
fluid State" at the ordinary Tem-
-perature of the Atmosphere.

Mr. Pallas Congoa'd Mercury
in 1772 at Krasnjark, by the
Natural Gold: he then found
it resembled soft Tin.

2 In how many States has
Mercury been found?

A. In five—

found in Mines—

Several Pounds of Mercury
were found in a Well at
Vienne in Dauphiny.—

Mercury is sometimes naturally
amalgamated with other Metals,
such as Gold, Silver, Arsenic, &c.
Copper—

Mercury is usually mineralized
by Sulphur; and the Product
is Cinnabar.—

and Brim Water—

Sulphuric acid acts very slightly
on Mercury—

The yellow oxide obtained by means
of the sulphuric Acid, is known by
the Name of Turbith Mineral.

Nitrate of Mercury is Corrosive—

The Mercurial Nitrate of Mercury
heated in a Crucible, is fused,
and emits a considerable quantity
of nitrous gas together with its Water
of Crystallization. The remaining
Residue becomes Yellow; and at length
assumes a lively Red colour, and
forms the Substance Called Red
Precipitate. ~~11~~

2. Does not the Muriatic Acid com-
-pletely dissolve the Mercurial oxides.

A. When

A When these oxides are nearly in the metallic State, or charged with a small quantity of Oxygen, the Mercurial: of Mercury is formed.

When on the contrary, the oxide of Mercury is saturated with oxygen, the oxygenated Mercurate of Mercury, or Corrosive sublimat of Mercury, is formed. —

2. What is the Method of making this Salt in the dry way?

A. Equal parts of dried Nitrate of Mercury, decripitated mercurate of Soda, and Sulphat of Iron calcined to whiteness, are mixed together. This Mixture being exposed to Sublimation the product which arises is a Corrosive Sublimat. —

Barytes, Magnesia, and Lime decompose this Salt —

aq: Phagogenia formed by Corros. Sublimat and Lime water —

The Corrosive Mineral of Mercury differs
therefore from the mild Mineral of
M. by the State of its acid. —

Concerning Silver —

Nitric acid Dissolves Silver the Solution
then lets fall Crystals the Solution
of these Crystals generally known
by the Name of Solution of Silver
is very caustic. —

Concerning Gold —

I found almost always in a native
State — and in Octahedrons in the
Gold Mines of Boitza in Transylvania.

Platina

It has been found only in the native
State — It has been found among the
auriferous Sands of South America.
Its form is that of small grains of a livid
white colour.

Vessels of Platina may be formed, by
filling Clay Moulds with the Alloy
of Platina and Arsenic:

Morveau fused Platina with his
Vitricous flux, made of powdered
Glass, Borax, and Charcoal —

on account of its Infusibility it is very
useful for Crucibles —

Useful for Mirrors in Optical
Instruments —

Concern Tungsten

Is of an opaque white colour
very heavy, and of a moderate degree
of hardness — found in Mines in
Cornwall —

The white powder which is obtained
by decomposing the alkaline Solution
of Tungsten by an acid, is acid to the taste
call Tungsten acid

Concerning Wolfram -
It is of a blackish brown colour

Molybdena
It is composed of scaly particles, slightly
adherent its aspect is bluish -

No 7.
Q. How is affinity exercised?

A. It is exercised either between principles of the same Nature or between principles of a different Nature. —

Q. How many kinds of affinity with respect to the Nature of Bodies may be distinguished?

A. 1. The Affinity of Aggregation, or that which exists between two principles of the same Nature.

2. The Affinity of Composition or that which retains two or more principles of different Natures in a state of Combination.

Q. Can you give an Examp. of Affin^y of Aggregation?

A. Two drops of Water form an aggregate.

Q. ^{Has} ~~Has~~ every individual Substance
its peculiar affinities with the various
Substances presented to it?

A. Yes - Nature has wisely varied
the affinities and appointed to
each Body its Relation with all
those that can be presented to it.

Q. Is it in consequence of this difference in the affinities
that all Chemical decompositions are effected?
A. Yes, all the operations of Nature & Art are founded upon it.

Q. How is the affinity of Com=
position divided?

A. Into simple affinity, double
affinity, the affinity of an inter=
=medium, Reciprocal affinity &c.

Q. What is an example of simple
affinity?

A. Two principles united together,
and separated by means of a third -

Q. What is the Body disengaged Called?
A. Precipitate

Q. Is the precipitate always formed by the disengaged Substance?

A. No. Sometimes the new Compound itself is precipitated: as for example when I pour the sulphuric or vitriolic acid on a solution of Muriate of Lime.

Sometimes the disengaged Body and the new Compound are precipitated together: as when the Sulphate of Magnesia or Epsom Salt is dissolved in Water and precipitated by means of Lime-water.

Q. What Constitutes the double affinity?

A. When the Compound of two principles cannot be destroyed either by a third or fourth Body separately applied: But if these two Bodies be united and placed in Contact with the same Compound a Decomposition or Change of principles will then take place.

Example— The Sulphat of Potash or Vitriolated Tartar is not Completely decomposed by the Nitric acid. or by Lime. when either of these principles is separately presented; but, if the Nitric acid be combined with Lime, this Nitrate of Lime will decompose the Sulphate of pot-ash. In this last Case the Affinity of the sulphuric acid with the alkali is weakened by its Affinity to the Lime. — This acid therefore is Subject to two Attractions: the one which retains it to the Alkali and the one which attracts it towards the Lime — Krievan has called the first Quiescent affinity and the other the Dissellent. —

2, What is called the affinity of an intermediate medium?

A. When two Bodies which have no perceptible affinity to each other, obtain a Disposition

to unite by the intervention of a third -

Exam - An Alkali is the intermedium
of union between Oil and Water: hence
the Theory of Lixiviums, Washings &c. -

^{VII}
Q. ~~Do~~ The particles which are brought together
and united by affinity, whether they
be of the same Nature or of different
Natures, continually tend to form
Bodies of a polyhedral, Constant, &
determinate form. -

A. Yes.

Q. What is the best Method to dispose
a Substance to Crystallization?

A. It is necessary to reduce it to the
most Complete State of Division. -

Q. How is this Division to be effected?

A. By Solution or by an Operation
purely mechanical. - i.e. either
by Water or fire

2 How is the Solution of Salts performed?

A. in Water

2, How of Metals

A. By fire.

2. How many Circumstances are Required that the form of a Crystal may be regular.

A. Three, Time, a Sufficient Space, and Repose.

2. Does ^{not} the proportion of Water of Crystal-
-ization ~~not only varies~~ vary greatly in
the different Salts -

A. Yes - But it adheres with greater
or less strength. There are some which
suffer this Water to fly off when they are
exposed to the air; such as Soda or the
Mineral alkali, the Sulphate of
Soda or Glaubers Salt, &c. —

There are others, which obstinately retain
the Water of Crystallization; such as the
Minerat. of Pot-ash or the Nitrat. of Pot-ash or Common Nitre.

Q. Does not the simple Cooling of the fluid in
holds the Salt in Solution precipitate a
Considerable quantity?

A. Yes -

Crystallization begins at the Sides of the Vessel first
as the Refugation is greatest there.

Q. Does not the Change from heat to Cold
in the Atmosphere dissolve sometimes a
great and sometimes a less Quantity of
Water? and Constitutes Mists, the Evening
Dew &c. -

Q. Do not Salts possess the property of
Lying along the Sides ^{most enlightened part of the} of the Vessels which
Contain the Solution.

A. Yes. ^{and is} What is called Saline Vegetation

Q. Does not this phenomenon depend on
the concurrence of Air and Light?

A. Yes.

Q. What are the various means employed
by Chymists, to overcome the Adhesion
exists between the Particles of Bodies.

Q. The Hammer, the Knife, the pestle &c.

Q. What other way -

A. By Solution -

Q. Does not Trituration facilitate Solution?

A. Yes. By presenting a greater Number of Surfaces -

Q. Does not the Solution of a Body constantly produce Gold?

A. Yes.

Q. What are the principal Solvents employed in our Operations?

A. Water, Alcohol, and Fire.

Q. Is it not a fact ascertained at first by Stahl that the oil of Vitriol and Charcoal produce Sulphur?

A. Yes -

Q. Is it not eternally true, that the Combustion of Sulphur affords the Sulphuric Acid?

A. Yes.

2. What are those Agents to we continually find in the examination and Analysis of the Component parts of the Globe?

A. Light, heat, and Carbone are of this Number.

2. What Did Aristotle and Empedocles acknowledge as Elements?

A. Air, Water, Earth, and Fire, —

Concerning Fire.

2. What is the most usual acceptation of the Word Fire?

A. Heat and Light.

Concerning Caloric and Heat.

2. What is meant by the fluid of Heat Called Caloric?

A. It is the slight movement of Undulation in the surrounding air which may be observed in a Body during its Cooling.

understood by
meant by

2. What is fire?

A. It is the principal Agent employed by Nature to ballance the power and natural effect of Attraction. —

2. What could have afforded the earliest idea of it?

A. The Shock of two flints
the Action of Meteors Volcanos
Hc —

Conc. Caloric & Heat. —

2. In what is Caloric Contained?

A. It is Contained in greater or less quantities in Bodies according to the greater or less degree of Affinity existing between it and them. —

employed to

of Affinities
upon the Sulphur
takes its

action and

all the heat
it giving
it has

A. Yes
the degrees
of Ice
Called
the

thermometer
the higher
at.

169

purest
in proportion to the heat
170

applied as wrinkles in the fire in proportion to the heat

2. In How many States is Heat ~~disengaged~~

A. In a State of Liberty, or in a State of Combination. in yth Case it always endeavours to obtain an equilibrium and is dispersed among Bodies according to their degree of affinity. Metals are easily penetrated by this fluid and transmit it to equal facility Wood receives it to the degree of Combustion

To Calculate the heat from living Bodies or determine with precision the Temperature of any Substance Messrs De la place and Lavoisier have invented an apparatus. It is constructed on the principle that Ice absorbs all the heat communicated to it without communicating it to other Bodies until the whole is fused -

It consists of 3 Circular Vessels nearly inscribed in each other; so that three Capacities are produced - The interior Capacity is formed by an Iron Grating upon Supports of the same Metal. Here it is the Bodies subjected to Experiment are placed - The upper part is closed by a Cover. The middle space next this contains the Ice which is supported by a grate covered with a Cloth - as the Ice melts the Water flows thro' the Grate and the Cloth and is collected in a Vessel placed beneath - The external Compartment contains Ice intended to prevent the effect of external heat of the atmosphere.

2. May not various means be employed to
to displace or disengage Caloric?

A. Yes, the first is by the method of affinities
for example, Water poured upon the Sulphur-
-ic acid expels the Heat, and takes its
place; - 2nd method is by friction and
compression -

Let us now

2. Does not ~~the~~ Ice absorb all the heat
Communicated to it, without giving
it out to other Bodies until it has
acquired the fluid State. - A. Yes -
and from hence we may calculate the degrees
of heat communicated by the quantity of Ice
which is melted.

2. What are the Instruments called
which have been invented to appreciate the
Degree of heat?

A. Thermometers Pyrometers &c.

2. Which is the most accurate Pyrometer

A. Mr Wedge Wood - to appreciate the higher
degrees of heat.

2. How is it constructed?

A. Upon the principle, that the purest
Clay shrinks in the fire in proportion to the heat
applied

2. How can you Calculate with Strictness
the heat which escapes from living Bodies
or determine with precision the tempera-
ture of any Substance.

A. By the apparatus of Messrs. De la
Place and Lavoisier. —

2. Do not different Bodies absorb heat
in greater or less quantities?

A. Yes, red cloth will be buried
in the snow while white had not
suffered any Depression.

2. Does not Water during evaporation
Continually Carry with it a portion
of heat;

A. Yes, and hence, perhaps Result the
Advantages, of transpiration perspiration
&c.

Q. Does not heat very frequently combine with a true Chemical Union with the Bodies which it volatilizes?

A. Yes. this Union is so perfect that the heat is not perceptible, but is neutralized by the Body with which it is combined.

Q. What is it then called?

A. Calor Latens.

Q. Does not every Body which passes from the solid to the Liquid State absorb Heat? A. Yes. — The fusion of Ice absorbs Heat — Also the fusion of Metals, Sulphur, phosphorus, Alum Nitre &c. —

Q. What are the Mixtures that produce the greatest Degree of Cold?

A. 11 parts of Murat of Ammonia or

Common Sal: Ammon: - 10 parts
of Nitrate of pot-ash, or Common
Nitre; 16 parts of sulphate of Soda
or Glaubers Salts - with 32 parts
by weight of Water the two first
Salts should be dry, and in powder. -

Q. What is the second principle?

A. That all Bodies ~~by~~ by passing
from the solid ~~to the fluid~~ or
fluid State to the aeriform State
absorb heat which becomes latent
and it is by Virtue of this heat that
such Bodies are placed and main-
-tained in that State. -

Q. Is it on this principle that the
process used in China is founded
to Cool Liquors used for drink. -

A. Yes -

Q. How is this performed?

A. The Water intended for this purpose is put into very porous Vessels, and exposed to the Sun, or to a Current of Warm Air, to Cool the fluid Contained within them.

Q. Is it not well known that if the ball of a Thermometer be wrapped in fine linen and kept moist by sprinkling with Ether, and the evaporation be facilitated by agitation in the air, the Thermometer will descend to 0. — A. Yes.

Q. When the Body perspires strongly is it not less heated than perspiring Bodies? — A. Yes.

Q. As Evaporation is increased by the agitation of the air is not the Refrigeration greater? —

A. Yes. hence the Use of fans &c.

Q. Is not warm and dry Air best suited to form a Refreshing Current?

A. Yes.

Q. Why so?

A. Because it is more Calculated to dissolve and absorb humidity.

Q. Is not moist Air less proper?

A. Yes, because it is already saturated

Q. Does not this show the Necessity of frequently Renewing the Air to preserve the Coolness of our Apartments?

A. Yes. The Physician who is desirous of moderating the excess of heat in the Body of a patient ought to maintain the Air in that Disposition is most suitable to his views.

Q. Is almost all fevers and perspirations what are the Advantages Resulting?

A. That of expelling the Morbific Matter and Carrying off the Matter of heat —

(11)
Q. May not the use of Vol. Alk in
Burns Tooth-ach &c be ascribed to
its Volatility - quickly Combining w
Heat - Carries it off and leaves an
impression of Cold? ^{Yes} J. It acts in
the Colic upon the same principles.

Q. Does not Water at the instant of
Congelation develop several degrees
of Heat - ~~Water colder~~ ^{Yes} -

Q. How are gaseous substances maintained
in the aeriform State?

A. By the heat which is Combined with
them -

(Note - this ought to have been
inserted when treating of Ice.)
The Academicians of Florence filled a
Vessel with powdered Ice and plunged
a Thermometer in it, which descended
to 0. The Vessel was then immersed in
boiling Water and the Thermometer did
not rise during the whole time of
the Liquefaction of the Ice. The fusion of
Ice therefore absorbs Heat.

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Concerning Light.

Q. How is Light transmitted to our Eyes?

A. By a peculiar Fluid it occupies the Interval between us and visible Bodies —

Q. Is not the motion of Light very Rapid?

A. Yes, it passes nearly thro' 80000 Leagues in a second —

Q. Is the Ray of Light bend down?

A. Yes. ^{for if the Blade of a Knife be presented to it the Ray will follow a right line}
The Elasticity of the Rays of Light is such that the angle of Reflection is equal to the angle of Incidence

Q. What are the primitive

Rays — Red, orange, yellow, green, blue, Indigo, Violet.

Q. How many Colors do the Dyes present us with —

A. Only three — Red, blue and yellow.

1. Does the combination and proportions of these ^{three} principles form all the shades of color with which the Arts are enriched. —

2. Can Vegetation take place without Light?

A. No. deprived of this fluid ~~the~~
Plants become pale — and in
in hot houses the light comes
to them from one part only.
The Vegetables incline toward
the Aperture as if to shew the
necessity of this Beneficial fluid.

2. Are not vegetables indebted to the
Light for their smell, taste, con-
= sistency, maturity, and their
Essential principle as well as
their colour

A. Yes —

Q. Has it not been observed that Worms
Crawl & living in the Earth are of
a white colour. A. Yes

Q. Do not Vegetables when exposed
to open day light, or to the Sun's
Rays emit vital Air? A. Yes.

Q. Does not Light discharge vital
Air from several Fluids - Such
as the Nitric Acid, the oxygenated
Marine Acid? A. Yes

Q. Does it not reduce the oxides or
Calces of Gold, Silver, &c.

Q. Does not Organization, Light,
Sensation, Spontaneous Motions
and Life, exist only at the Surface
of the Earth, and in places exposed
to Light?

A. Yes - Without Light Nature was lifeless
inanimate, and dead. A benevolent God,
by producing Light, has spread Organization, Sensation, and

Thought over the Surface of the Earth.

Concerning Sulphur. N^o 8

Q. What is meant by Sulphur?

A. It is a Body of an orange-yellow Colour, dry, brittle, Capable of burning with a Blue flame, and exhaling a penetrating odour during Combustion.

Q. How is Sulphur formed?

A. By the Decomposition of Vegetable and Animals — It has been found on the Walls of necessary Houses;

Q. Does it not exist naturally in Certain plants, such as *Patentia*, *Cochlearia* &c. —

A. Yes.

Q. Is it not Contained in Coal Mines?

A. Yes. Identically.

2. What are the processes for extracting Sulphur in the large Way?

A. They consist in disengaging it from the Pyrites or Sulphures of Copper, or of Iron, by methods possessing various degrees of Simplicity and economy. In Saxony and Bohemia the ores of Sulphur are distilled in earthen Tubes disposed in a gallery. - The Sulphur which is disengaged by the Heat passes into Receivers placed without, and in which Care is taken to keep a Sufficient Quantity of Water

^{Are}
2. Do not the Earths and Stones which Contain Sulphur distill? A. Yes

2. Is it not the Result of this Distillation which is call'd Crude Sulphur?

A. Yes.

2. How is it reduced into Sticks or Moulds?

A. By fusing it and pouring it into Moulds.

Q. How is it formed into flowers of Brimstone?

A. By fusing it and pouring it into water.

A. By subliming it with a gentle heat?

Q. Is not Sulphur found naturally Crystallized in Italy?

A. Yes.

Concerning Carbone.

Q. What is meant by Carbone?

A. Pure Charcoal.

Q. How does Carbone exist?

A. Ready formed in Vegetables.

Q. Why is Carbone placed among Simple Bodies?

A. Because no experiment has hitherto shown the possibility of decomposing it.

When it is required to procure Carbone in a state of great purity it must be dried in a close vessel by strong ignition.

Concerning Gases, or the Solution
of certain principles in Caloric,
at the Temperature of the
Atmosphere.

2. In what consists the Reduction
of a Substance to the State of Gas?

A. Dissolving it in Caloric.—

2. What is the more simple method
of reducing any Substance to the State
of Gas?

A. It consists in placing a Body in
Contact with another Body which is
heated.

2. Are all solid Bodies Capable of
passing to the gaseous State?

A. Yes. and the only difference between
them is, that a Dose of Caloric is
required for this purpose, which
is governed—1 By the Affinity of Aggregation

No 9

which connects their principles, Tends
them and opposes itself to a new
Combination. 2 By the weight
of the Constituent parts, which tends
their Volatilization more or less
Difficult - 3 By the agreement and
attraction between the Caloric and
the Solid Body, which is more or
less strong.

Q. In how many states do Bodies
whether solid or Liquid when they come
to be volatilized by heat appear?

A. Two that of Vapour, and that
of Gas. - in the first Case the Caloric
Substances lose in a short time the
Caloric which raises them and
again appear in their original
form the Moment the Caloric finds
Colder Bodies to Combine with - in
the second the Combination of Caloric
with the volatilized Substance is
such that the ordinary Temperature of
the Atmosphere is insufficient to overcome this Union.

Concerning Hydrogenous Gas,
or Inflammable Air—

Q. What ~~off~~ How is the purest Hydro-
-gen Gas obtained?

A. By the Decomposition of Water

Q. How is this obtained?

A. By pouring the Sulphuric Acid
on Iron or Zinc. — The Water
which serves as a Vehicle for the
Acid, is decomposed on the Metal,
its oxygen combines with it, while
the Hydrogen Gas escapes.

Water may be decomposed likewise still
more directly by throwing it upon Iron
strongly heated; — Vegetable fer-
-mentation and Animal putrefaction,
likewise produce this gaseous
Substance.

2. What are the Properties of this ^{No. 2} Gas?

A. 1 It has a disagreeable, stinking
Odour,

2. It is not proper for Respiration.

Birds placed in a Vessel containing
it died - ~~without~~ without producing any
Change in the Gas itself. -

We may conclude indeed that
inflammable Air is not a poison,
but that it cannot be considered
as an Air essentially proper to
Respiration.

2. Is not Hydrogenous Gas com-
- bustible alone?

A. No It does not burn but
by the Concurrence of Oxygen.

2. Is not Hydrogen lighter than com-
- mon Air?

A. Yes - The Theory of Balloons, or

aerostatic Machines, founded on the
levity of the Hydrogenous Gas.

In order that a Balloon may rise
in the Atmosphere it is sufficient
that the weight of the Balloon itself
and the Air it encloses, should
be less considerable than that
of an equal Bulk of Atmospheric
Air. — And it must rise till
its weight is in equilibrio with
an equal Volume of the surrounding
Air —

2. Does not the color of Hydrogen
vary according to its Mixtures?

A. Yes — The Various Mixtures of
the Gases when expressed out
of an aperture in order to burn them
have in the hands of Certain Operators
afforded very agreeable illuminations
well deserving the attention of learned and
curious Observers.

Q, Does not Hydrogen gas possess the property of Dissolving Sulphur.

A. Yes, in this Case it Contracts a stinking smell and forms Hepatic Gas.

Q, What are the most general properties of these Gases?

- A. 1 They render white Metals black.
 2 They are improper for Respiration.
 3 They impart a green Colour to Syrup of Violets.
 4 They burn with a light blue flame, and deposit sulphur by this Combustion.
 5. They mix with oxygenous Gas of the Atmospheric Air and form Water
 6 They impregnate Water — and are sparingly soluble in it.

The Air which burns at the surface of
Certain Springs and forms what is
known by the Name of burning Springs
Consists of Hydrogenous Gas hold-
-ing Phosphorus in Solution —

It smells like putrid Fish.

The Ignes fatui which glide along
burning Grounds, and which super-
-stitious people suppose to consist
of the Spirits of the departed, are
Phenomena of this Nature. —

Concerning Oxygenous Gas
or Vital Air Discovered by the
Celebrated Priestley 1st of August 1774

Q. Is not this Air the most general
agent in the Operations of Nature?

A. Yes.

Q. Does not a Metal exposed to the
Air become Changed? A. Yes

Q. How are these Changes produced?

A. By the combination of the pure Air with the Metal itself.

Q. Is not simple Distillation of some of these Metals thus changed sufficient to disengage this Vital Air? A. Yes and it is then obtained in a very pure state by receiving it in the Hydro-pneumatic Apparatus — One ounce of red precipitate affords a pint. —

Q. Have not all Acids Vital Air for their Base? A. Yes.

Q. Do not Vegetables exposed to the Light of the Sun emit Vital Air?

A. Yes —

Q. Is not the emission of vital Air
proportioned to the Vigour of the
Plant, and the Vivacity of the Light?

A. Yes—

Q. How do you procure the Vital Air
which is disengaged from Plants?

A. By enclosing them beneath a Glass
Vessel filled with Water, and inverted
^{over} a Tub filled with the same
fluid— The Moment the plant
is acted upon by the Sun, small
Bubbles of Air are formed on its
Leaves—

Q. Does not the plant absorb
Atmospherical Mephitic, and emit
Vital Air— A. Yes. Man on the
Contrary, is kept alive by Vital Air
and emits much Mephitic— it appears
therefore that the Animal and Vegetable Kingdom
labour for each other.—

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And that by this admirable Reciprocity
of Service the Atmosphere is continually
repaired, and an equilibrium
maintained between its constituent
principles —

2. Does not the influence of Solar light
disengage this Gas?

2. May not oxygenous Gas be obtained
by disengaging it from its bases
by means of the Sulphuric Acid?

A. Yes — By pouring Sulphuric
Acid on Manganese to form a
liquid paste — fit a Cork to the hole
of the Bottle with an opening through
it into which is inserted a curved
Tube; one of whose extremities enters
the Bottle, while the other is placed
under the Shelf of the pneumatic Che-
mical Apparatus When the Apparatus

is thus disposed, I present a female
Coal to the lower part of the Bottle
and oxygenous Gas is immediately
Disengaged —

^{Does not}
Q. Vital Air obtained from Mercurial Oxide,
always holds a small Quantity of
Mercury in Solution —

A. Yes I have been a Witness to its
having produced a speedy Salu-
-vation on two persons who used
it for Disorders of the Lungs. —

Q. Is the oxygenous gas extracted
from plants equally pure with
that afforded by metallic Oxides

A. No. —

Q. What are its general properties?

A. 1 It is more ponderous than the
Air of the Atmosphere.

2. It is the only Air proper for
Combustion.—

1st Principle — Combustion never takes
place without Vital Air—

2nd In every Combustion there is
an Absorption of Vital Air—

3rd There is an Augmentation of
Weight in the product, of Combustion
equal to the Weight of the Vital Air
absorbed—

4th In all Combustion there is
a disengagement of Heat & Light.

2. In most Combustions does
not the Oxygenous Gas become
fixed and Concrete? A. Yes,
It therefore abandons the Caloric
which maintained it in the aeri-
form state; and this Caloric being
set at Liberty, produces heat

~~by being for a while~~, and en-
deavour to combine itself
with the substance nearest
at hand.

2. Is not the Disengagement of heat
a constant effect in all the cases
wherein vital air is fixed in
Bodies; ~~it follows from~~

A. Yes. and it follows from this
principle - 1 That Heat is most
eminently Resident in the oxygenous
Gas which maintains Combustion.

2 The more oxygen that is absorbed
in a given time, the stronger will
be the Heat -

3rd That the only method of producing
a violent Heat consists in burning
Bodies in the purest air

4. That Fire and Heat must be more intense in proportion as the air is more Condensed.

5 That Currents of Air are necessary to maintain and expedite Combustion. — It is upon this principle that the Theory of the effects of the Cylinder Lamps is founded: the current of Air, which is renewed thro' the Tube, supplies fresh Air every instant: and by continually applying a new Quantity of oxygenous Gas to the flame, a heat is produced sufficient to ignite and destroy the Smoke. —

Mr. Ingenhousz has shown us, that if an Iron Wire be bent into a Spiral form, and any Combustible Substance whatever be fixed to one of its ends, and set on fire the Wire will itself be fused by plunging it into ¹⁸³ oxygenous Gas.

Mr. Forster of Göttingen found that the
light of Glow Worms, is so beautiful
and bright in Oxygenous Gas, that
one single Insect was sufficient
to afford Light to read the Announces
Savantes of Göttingen printed in
a very small Character —

2. How many States do you distin-
guish in the act of Combustion?

A. Three Ignition, Inflammation,
and Detonation. —

2. How is the flame of a candle
kept up?

A. By the Volatilization of the Wax.

2. What occasions the Detonation in the
Explosion of Gun-powder?

A. The sudden production of Carbonic
Acid of Nitrogen Gas &c. —

2. Does not the instantaneous pro=
duction of any gas whatever occasion
a shock or agitation in the Atmos=
phere A Yes -

2. Is not the oxygenous Gas the
only Gas proper for Respiration
A. Yes - it is what has entitled
it to the Name of Vital Air.

2. What is the Gas emitted by ex=
piration Composed?

A. It is a Mixture of Nitrogen Gas,
Carbonic Acid and Vital Air - If the
Air which issues from the Lungs be
made to pass thro' Lime Water
it renders it turbid; If it be receiv=
ed thro' Tincture of Turmole it
reddens it and if an alkali
be substituted it becomes effervescent.

Q. What is the first effect which the Air appears to produce upon the Blood
A. That of giving it a Vermillion Colour

Q. What is the second effect of Respiration? A. It is to establish a local focus of heat in the Lungs.

Q. Does not the heat in each Class of individual animals be proportioned to the Magnitude of their Lungs? A. Yes according to De Buffon &c

Q. Animals with Cold Blood have only one Auricle and Ventricle — A. no more.

Q. Have not Persons Respiring Vital Air perceived a gentle Heat vivifying the Lungs and unusually extending into all the other parts of the Body.

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2, What Kind of an Operation may Respiration be Considered?

A. It may be considered an Operation by means of which Vital Air passes continually from the gaseous to the Concrete State: it must therefore abandon at each instant the heat which held it in Solution, and in the State of Gas. This heat produced at every inspiration must be proportioned to the Volume of Lungs to the Activity of this Organ, to the purity of the Air, the Rapidity of the Inspirations — &c.

2. During the Winter the heat produced must be more Considerable? A. Yes. because the Air is more Condensed, and exhibits more vital Air under the same Volume.

2. The Lungs of Asthmatic Persons are less Capable of digesting the Air and emit it without Vitiating it

A. Yes -

Q. Is not this the cause of their Complexion being cold and their Lungs continually languishing -

A. Yes - Vital Air is wonderfully Comfortable to them -

Q. Does not Vital Air by combining with the Blood form the Carbonic Acid?

A. Yes - which may be considered as Antisputercent as long as it remains in the ~~by~~ Circulation, and that it is afterwards emitted thro' the pores of the Skin, according to the experiments of the Count De Milly

Q. Has not Vital Air been used with success in Certain Disorders of the human Body?

A. Yes in Phthis Pulmonalis

How Do you purify the ^{Corrupted} Air of any given place?

A. This may be done in three Ways.

The 1st Consists in Correcting the vitiated Air by means of Substances which are Capable of seizing the Noxious principles.

The 2nd Consists in displacing the Corrupted Air, and substituting fresh Air in the Room of it.

As is done by means of Ventilators the Agitation of Doors &c. —

The 3rd Consists in pouring into the Mephitic atmosphere a New Quantity of Vital Air?

Concerning Nitrogene Gas, Azote
or
Atmosphercal Mephitis.

Q. What is meant by Nitrogene Gas?

A. That Air which has no longer served the purposes of Combustion and Respiration -

Q. What are the Methods used to obtain Nitrogene Gas in a pure State?

A. Scheele has taught us, that by evaporating Sulphure of Alkali, or Liver of Sulphur, in a Vessel filled with Atmosphercal Air, the Vital Air is absorbed; and when the Absorption is Complete, the Nitrogene Gas remains pure - 2nd When by any means such as the oxidation of Metals, the Rancidity of Oils, the Combustion of Phosphorus &c. the Vital Air of the Atmosphere is absorbed the Residue is Nitrogene Gas. —

Geological Observations

The Observations of Naturalists all unite to prove that the central part of the Globe consists of the Stone known by the Name of Granite. we may therefore consider this Substance as the Nucleus of the Globe. and upon this Substance it is that all Matters of posterior formation rest.

Concerning Metallic Substances—

Concerning Arsenic

Which is sold in commerce is a Metallic Oxide of a glittering Whiteness - The Smell of Garlic and the white fumes are indications of the presence of Arsenic in any Substance—

M^r Navier proposes a direct counterpoison for persons poisoned by Arsenic—

He prescribes one Dram Refined Sulphur to be dissolved in a pint of Water & the patient is directed to drink at several draughts 187

The Sulphur unite, to the Arsenic & destroys its Causticity.

Ureya has likewise been recommended by M^r. Sage.

Chap. ii

Concerning Cobalt

Is combined in the Bowells of the Earth with Sulphur, Arsenic, and other metallic Substances.

Nickel

Bismuth.

Its property of amalgamating completely with Mercury may cause it to be applied with advantage in the silvering of Glasses, by an Amalgam of tin, bismuth, and Mercury. —

Concerning Antimony.

It is found in the Bowels of the earth, in four different States.

1. In the Metallic form
2. Combined with Arsenic
3. Mineralized with Sulphur.
4. In the state of Oxide.

Butter of Antimony contains 2 parts of the corrosive Mercurate of Mercury and one of Antimony distilled together.

The Acid of Tartar forms a very well known salt with Antimony - which is called Emetic Tartar, stibiated Tartar. In the New Nomenclature - It is distinguished by the Name of Antimoniated Tartrate of Pot ash.

Heemes Mineral

It is given in petulant Cases and in Obstructions of the Lury - in a considerable dose it is sudorific and in a large portion emetic - it is employed in the dose of ʒr to ʒss grain to ʒ -

Concerning Zinc -

Zinc dissolved by the sulphuric acid in the cold produces
Much hydrogenous Gas. A Salt may be
obtained by evaporation known by the Name
of Vitriol of Zinc, White Vitriol, Sulphate
of Zinc

Manganese

A Mineral of a grey or blackish Colour

Lead

The muriatic acid with Lead forms the
yellow pigment known in London by the
Name of Patent Yellow. -

Concerning Iron.

Concerning Mercury -

Native Mercury has been found in digging the
foundations of some houses at Montpellier.
it likewise has been found in a Well at
Vienne in Dauphiny -

Mercury is usually mineralized by Sulphur
and the product is Cinnabar -

Mercury is sometimes naturally amalgamated

with other Metals, such as Gold, Silver, Arsenic
Copper &c.

In order to make a fine red precipitate the
Mercurial solution must be put in a Retort
and distilled until no Vapours come over —
An additional quantity of Nitric Acid must
then be poured on the Remains and likewise
distilled off after 3 or 4 repeated distillations
a very superb beautiful precipitate is ob-
tained in small crystals of a very super-
b red colour.

~~When the acid~~ The Muriatic acid completely
dissolves the Mercurial oxides. When the acids
are saturated with Oxygen the oxygenated
Mercurate of Mercury is formed —

Half a grain of Corrosive sublimate in powder
thrown into a pint of Lime Water forms
a yellow precipitate known by the Name
of Phagedenic Water —

4 Ounces of Mercury triturated with 12 Ounces of
Sublimed Sulphur in a glass Mortar. The Result
is a black powder called Ethiops Mineral.

Corrosive Muriate of Mercury ~~or mercurius dulcis~~ differs from the
Mild Muriate of Mercury ~~or mercurius dulcis~~ by the
State of its Acid - Merc: dulc: may likewise be
made by decomposing Mercurial Water by a solution
of the Muriate of Soda & Silver the white precipitate is obtained may
be sublimed and forms an excellent Merc: dulc: -
Naturally Exists ^{Naturally} ~~sometimes~~ in Vegetables.

Platina

Camphor is obtained from a Species of
Laurel which grows in China & Japan.
Some Travellers affirm that the old trees
contain it so abundantly that in
splitting the trunk it is found in large
tears - Camphor is obtained by distillation

from the roots of Zedoary, Thyme Rosemary,
Balsam copaiba flows from a tree of the Name of Copaiba
Balsam of Mecca ^{in South America near Yolu.} it flows from incisions made
in the Amyris opobalsum. It is known by
the Names of Balm of Judea, of Egypt,
Seahy Wax. found of Candace Gum Lac
2 drams of turpentine. 13 of Cinnaiber & 1 of Minium

The lac and the Colophony are to be first fused
after which the turpentine is to be added
and lastly the Colouring Matter.

Concerning Balsams

Three principal Kinds - viz Benzoin: Tolu, and
Storac calamita.

1 Benzoin. — 2 kinds Benzoe amygdaloides
and the common Benzoin. — It comes to us
from the Kingdom of Siam and the island of
Sumatra but we do not know the tree it
comes from —

Benzoin laid on hot coals fuses, pounded
and boiled in Water affords an acid salt which
sublimed forms the Substance called flowers
of Benzoin —

Asa fetida is met with in tears of a
yellow white colour The plant which
affords it is called ferula Asa fetida —
Aloes

Succotrine, hepatic, and Coballine; it is made
by incisions in the leaves at ~~the~~ of the aloe vulgaris
Gum Arumoniae is very much used in Medicine

Elastic Gum is afforded by a tree called Seringa
by the Indians of Para. it burns as a
white flame & is used for illuminations instead of Wax

Ether is formed by causing the oxygenated Muriatic Acid to pass through Very pure Alcohol the oxygenated Acid resumes its character of ordinary Muriatic Acid —

Citric Acid or Lemon Juice —

Mr Haunstadt succeeded in converting the Acids of Tamarinds, Citrons, Grapes, &c — into the oxalic, tartareous, and Acetous Acids — from these experiments it appears that the oxygen, combined with a principle of alcohol forms the oxalic acid; and that a more accurate saturation of this principle to oxygen forms the tartareous & Acetous Acids.

Mr Lavoisier has proved that the known Vegetable Acids do not differ from each other but in the proportion of hydrogen and Carbon and in their degree of oxygenation.

Pyroligneous Acid - is obtained by distillation
from Wood -

Malic Acid -

Manna is extracted from the pine, fir, Maple,
Oak, Juniper, fig, Willow, Olive, Ash,
Larch & Alhagi. It affords, by distillation
Water, Acid, Oil, & Animoniac, and its Coal
affords Alkali. This substance forms
the basis of most purgative Medicines.

~~The plant ^{Opium} ~~is called~~~~

The poppy is cultivated in Persia
Near Derbent on the Caspian Sea there are
are springs of Naptha or a species of
petroleum according to Kempfer. There
is a place known by the name of the perpetual fire.
The Indians do not attribute the origin of this
inextinguishable fire to Naptha; but they
maintain that God has confined the Devil
in this place to deliver Man from him. They go in
Pilgrimage thither and make their prayers to God that he will not
suffer this Enemy of Mankind to escape.

Amber possesses less coaly matter than any other Bitumen -

The Combustion of those enormous Masses of Bitumen which are deposited in the Bowels of the Earth produces Volcanos.

~~The Heat~~ The hot springs owe their heat intirely to the decomposition of Pyrites

The whole Art of Distillation is reduced to the two following Principles

1. The Vapours ought to be ~~raised~~ ~~condensed~~ ~~disengaged~~ and raised in the most economical Manner.

2. And their Condensation ought to be as speedy as possible -

Ether Vitriolic formed by Alcohol and Sulphuric acid -

2 ounces of Spirit of Wine - 2 ounces of Ether and 12 drops of Ethereal Oil form the Anodyne Liquor of Hoffman.

The distillation of Brandy by a moderate
Heat forms Alcohol or Brandy —

Tartar is deposited on the sides of Casks during
fermentation this is called crude Tartar

The following is the process of obtaining
the Acidulous Tartrate of Potash — ~~or Cream~~
or Cream Tartar — The Tartar is dissolved
in Water and suffered to crystallize by cooling
The crystals are then boiled in another Vessel
with the addition of five or six pounds of
the white Argillaceous Earth of Murrice
to each quintal of the Salt. After this
boiling with the earth a very white Salt
is obtained by ~~distillation~~ evaporation —
which is called C. Tart. &c —

Acid fermentation

The Mucilaginous principle is more es-
pecially the substance on which acid fer-
mentation depends —

Putrid fermentation

Concerning Digestion

The Humour called Gastric Juice, is separated by Glands placed between the Membranes which line the Stomach — Spallanzani obtained thirty four ounces, ~~out~~ of the Stomachs of two Sheep — he caused ~~Animals~~ Crows to swallow eight at a time ~~which~~ thin tubes of Metal at a time pierced with ~~small~~ holes into it he had put Sponges very clean & dry —

It appears from the observations of Messrs Spallanzani and Goffe, that the nature of the Gastric Juice varies according to that of the Aliment — When the Diet is vegetable the Juice is acid —

M. Buegnatelli found in the gastric juice of Carnivorous ~~Animals~~ Birds an acid, Pus, & an Animal Substance united with a small Quantity of common Salt. In our time the phosphoric salts have been found in it —

Messrs Linnæ, Joggia, and Carmonati, have made the most successful applications of the Gastric Juice in the Treatment of Wounds —

is a Mixture of oil, Lymph, Serum & Salt.

Concerning the Blood —

Human contains a disengaged alkali —
Blood contains much Iron.

Concerning Fat.

Spermaceti

~~But~~ — Mr. Croll obtained an acid
from fat by Distillation —

Concerning the Bile —

By distillation in a retort it affords
Ammoniac, an empyreumatic oil, concrete
kali and inflammable air — It contains
Lime, Carbonate of Soda, & Phosphate of
lime — All the Acids decompose bile.
Alkaline solutions decompose bile by double
decomposition and produce Metallic Soaps —
The principles of bile are, Water, an
essential principle, a Lymphatic substance, a viscid
Soda.

The Bile is an excellent Vulnerary externally
applied internally it is a good Stomachic and
of the best Deobstruents the Art of Medicine
knows — Bile of a saponaceous quality —

Urine —

known to contain an excess of acid. in its natural
it may be considered a Water holding in solution
Sulphuric or Muratic Salt, then Soda, have Lime,
or Soda for their Basis —

Concerning Digestion

The Humour called Gastric Juice, is secreted by Glands placed between the Membranes which line the Stomach — Spallanzani obtained this from ounces, ~~out of~~ 2 Stomachs of two Sheep — he caused 2 Crows to swallow eight ~~at a time~~ ~~which~~ thin tubes of Metal at a ~~time~~ pierced with ~~small~~ holes into which he had put Sponges very clean & dry.

It appears from the observations of Spallanzani and Gossé, that the nature of the Gastric Juice varies according to that of the Aliment — When the Diet is vegetable the Juice is acid — M. Bugeatelli found in the gastric juice of Carnivorous ~~Animals~~ Birds an Acid & an Animal Substance united in a small Quantity of common Salt — In our time the phosphoric Salt, has been found in it —

Sept's Juice, Targia, and Carmonati, have the most successful applications of Juice in the Treatment of Wounds.

urine is a Mixture of oil, Lymph, Serum & Salt.

urine Concerning the Blood -
urine contains a disengaged alkali -
Blood contains much Iron.

Concerning Fat.

Spermaceti

~~Butter~~ - Mr. Cull obtained an acid
from fat by Distillation -

Concerning the Bile -

By distillation in a Retort it affords
Hydrogen, an empyreumatic oil, concrete
alkali and inflammable air - It contains
Carbonate of Soda, & Phosphate of
Lime - All the acids decompose bile
alkaline solutions decompose bile by double
decomposition and produce Metallic Soaps -
The principal principles of bile are, Water, an
essential principle, a lymphatic substance, a resinous
matter & Soda.

urine The Bile is an excellent Vulnerary externally
applied internally it is a good Stomachic and
one of the best Decobriants in the Art of Medicine
urine - Bile of a saponaceous quality -

Urine -

urine - known to contain an excess of acid - in its natural
it may be considered a Water holding in solution
chloride or muriatic Salt. When Salts, have Lime,
or Soda for their Basis -

Concerning Digestion

The Humour called Gastric Juice, is secreted by Glands placed between the Membranes which line the Stomach - Spallanzani obtained this from ounces, ~~out~~ of Stomachs of two sheep - he caused Crows to swallow eight ~~at a time~~ ~~which~~ thin tubes of Metal at a time pierced with ~~small~~ holes into which he had put sponges very clean & dry.

It appears from the observations of Spallanzani and Goffe, that the nature of the Gastric Juice varies according to that of the Aliment - When Diet is vegetable the Juice is acid -

M. Brugnatelli found in the gastric juice of Carnivorous ~~Animals~~ Birds an Acid & an Animal Substance united with a small Quantity of common Salt. In our time the phosphoric Salt has been found in it -

Neper's Juice, Toggia, and Carbonate, has the most successful Applications of Juice in the Treatment of Wounds -

Milk is a Mixture of oil, Lymph, Serum & Salt.

Concerning the Blood -

Serum contains a given aged alkali -
Blood contains much Iron.

Concerning Fat.

Spermaceti

~~Butter~~

W. Cull obtained an acid
from fat by Distillation -

Concerning the Bile -

By distillation in a retort it affords
Ammoniac, an empyreumatic oil, concrete
alkali and inflammable air - It contains
Iron, Carbonate of Soda, & Phosphate of
Lime - All the acids decompose bile.
Metallic solutions decompose bile by double
affinity and produce Metallic Soaps -
The constituent principles of bile are, Water, or
Spiritus Tector, a lymphatic substance, a resinous
oil, & Soda.

The Bile is an excellent Vulnerary externally
applied internally it is a good Stomachic and
one of the best Diobretics in the Art of Medicine
proper - Bile of a saponaceous quality -

Urine -

It proved to contain an excess of acid - in its natural
State it may be considered a Water holding in solution
the phosphoric or Muriatic Salts these Salts, have Lime,
ammoniac or Soda for their Basis -

N New Nomenclature.

Sublimed mucate of Antimony or Butter of Antimony
Emetic Tartar. or Antimoniated Tartrate of Potash
composed of Crem. Tartar or the Acidulous Tartrate
of Potash & Glap of Antimony, or Liver of Antimony
boiled in Water &c.

^{or Sulphur of Antimony}
Acme Mineral formed by the ~~Sulphur of Antimony~~
~~Sublimed~~ Antimony dissolved in sulphur
of Antimony — it is used

Oxide of Zinc or Lapis calaminaris —
White Vitriol — Sulphate of Zinc —
Made by dissolving Zinc in sulphuric acid
which when evaporated produces salt
mentioned —

Sublimed Oxide of Zinc or Flowers of Zinc
is given as an Antispasmodic by the German
Physicians it may be given in the dose
of 1 grain in pills at a ~~time~~ time.

Patent yellow or Mucate of Lead.

^{or acetate of Lead}
White Lead formed by the Acetous Acid on Lead
is corroded it

of Tin

* Baron Kienmayer describes the following amalgam composed of 2 parts of Mercury One of Zinc and one of Tin.

The Zinc and Tin are to be fused & mixed with Mercury & the Mixture is stated in a wooden box internally rubbed with Chalk. The mass is then to be reduced to a fine powder and employed in that State or mixed with grease. The effect of this amalgam is surprising; for by this means the power of electrical Machines is inconceivably augmented.

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in Egypt and Arabia

Acidulous Extract of P. Ash. or Crem. Tartar.

in Vinegar.

duly concentrated
spherical prisms
Sugar of Lead.

the Composition

Carbure of Iron.

pencils —

alls. 601 of 4 Arabian
4 lb common Water

is forms prussian

e Vitriol —

edignis —

with Mineral

Precipitate.

Corrosive Sublimated
or Lapis Infernalis
Caustic —

ly for Acacia

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N

New

Sublimed mucus

Emetic Tartar

Composed of Cer

of. P. Ash. &

boils in Water

Acimes Mineral

~~Defining~~ And

of Antimony

Oxide of Zinc

White Vitru

Made by dis

which when

mentioned -

Sublimed Ox

is given as an

Physicians

of 1 grain

Patent yellow

White Lead

is corroded

The amalgam of tin is used
to Silver Looking Glasses -
for this purpose, a leaf of
tin is spread out upon
a table of the size of the
Glass, Mercury is poured
upon it and spread about
with a brush. This being
done a larger quantity
of Mercury is poured upon
the Tin so as to form a
covering of more than one
line in thickness. The
Glass is placed upon this
covering, by presenting one
of its edges; taking care
at the same time that
its surface shall be bene

White Lead formed by the acetic acid and lead
is corroded

the level of the Mercury, in in Vinegar.
order that the impurities, duly concentrated
which might hinder a perfect rhedral prisms
contact might be driven before Sugar of Lead.
The Plate of Glass is in the Composition
then loaded with weights
equally distributed over
its whole surface, by Carbure of Iron.
which means all the excess pencils —
Mercury is pressed out balls. 6 Oz of Arabian
and flows away thro' Channels 4 lb common Water
made in the edges of the Table. is forms prussian
The air being driven out
from between the amalgam
of Tin and the Glass by this e Vitriol —
strong compression serves to expel
greatly to render the Amalgam with Mineral
adherent. — Several days Precipitate.
Corrosive sublimate
or Lapis Infernalis
Caustic —

Gum Arabic flows naturally from Acacia
in Egypt and Arabia —

Acidulous tartare of P. Ash. or Crem. Tartar.

N
New
Sublimed mucous
Emetic Tartar
composed of cream
of P. Ash. &
boiled in Water

Heimer Mineral
~~diffusing~~ this
of Antimony

Oxide of Zinc
White Vitru
Made by dis.
which when
mentioned -

Sublimed Ox.
is given as an
Physicians
of 1 grain

Patent yellow

White Lead formed by the acetic acid and lead
is corroded by it

are required to elaps
before it be sufficiently
dry to admit of Tempering
the Glass. — Tin alloy
with Copper forms bronze
or bell Metal. —

Copper.

Copperas formed by sprinkling Vine
on Copper

Molybdena

The Oxides of Lead are soluble in Vinegar.
The solution of the Acetate of Lead, duly concentrated
crystallizes in efflorescent tetrahedral prisms
and forms the Salt of Saturn: or Sugar of Lead.

Concerning Tin *

Tin dissolved in aqua fortis forms the Composition
for dying Scarlet.

Plumbago, or the Carbure of Iron.

is used to make black lead pencils —

To make good Ink - 1 lb Nut Galls - 6 oz of Gum Arabic
6 ounces of green copperas - 4 lb common Water.

Sugar is sometimes added

Iron dissolved by the prussic acid forms prussian
blue.

Sulphate of Copper - or Blue Vitriol —

Acetic Acid & Copper - forms Verdigris —

Sulphate of Mercury - or Turbith Mineral

Nitrate of Mercury - or Red Precipitate.

Oxygenated Muriate of Mercury or Corrosive sublimate
or Lapis Infernalis

Nitrate of Silver - or Lunar Caustic —

Gum Arabic flows naturally from Acacia
in Egypt and Arabia —

Acidulous tartare of P. Ash. or Crem. Tartar.

Camphor is obtained from a species of Laurel which
grows in Japan & China —

He is dear to me as a flower of the
field in the fields of heavenly love
Who taught and blest, for hallowed hearts
And when the bloody scene is over
Let your hearts be at the
Let the heart of Jesus be
He is dear to me as a flower of the
field in the fields of heavenly love
Who taught and blest, for hallowed hearts
And when the bloody scene is over
Let your hearts be at the
Let the heart of Jesus be

He is dear to me as a flower of the
field in the fields of heavenly love
Who taught and blest, for hallowed hearts
And when the bloody scene is over
Let your hearts be at the
Let the heart of Jesus be

Structure of Vegetables —

Bark compos^d 3 Tunics — 1. Epidermis, cellular tissue, and cortical Coatings — (The Bark is the most essential part of Vegetables, by means of which the principal functions of Life, such as Nutrition, digestion, &c. are performed.)

Water is the most essential Nutritive Principle of Plants. —

Van Helmont planted a Willow weighing 50 pounds in a certain quantity of earth covered with sheet lead; he watered it for five years with Distill^d Water; and at the end of that time the tree weighed 169 lb 3 oz. & the earth in which it vegetated was found to have suffered a loss of no more than 3 ounces.

The Earth to the plant as the placenta to the Infant ~~is~~ prepares & disposes the Blood of the Mother to become a suitable Nourishment.

Nitrogen gas serves them more particularly for aliment — Carbonic acid also

Vegetation may be successfully employed to correct air too highly charged with Carbonic acid or in which the Nitrogenous gas exists in too great a proportion. —

Article V

Light is absolutely necessary to plants. The property which plants possess of converting Nitrogenous gas and carbonic acid into Nourishment establishes an astonishing degree of Analogy between them & certain Insects. It appears from the observation of Frederic German that the Air may become a real food for the Class of Spiders. Ingenhousz is of opinion that the green matter which is formed in Water and transpires oxygenous gas by the light of the Sun is a cluster of animalcula has added to these phenomena. Insects have moreover the organ of Respiration distributed over the whole surface of the body.

Gum arabic flows from the acacia in
Egypt & Arabia -

Olives are ground & expressed the first
oil which comes out is called Virgin oil -
Oil easily combines with oxygen. This com-
bination is either slow or rapid. In
the first Caserancidity is the consequence
in the second inflammation - If Olives
be treated with boiling Water, to extract
the Mucilage, before they are submitted
to the press a fine oil will be obtained
without danger ofrancidity -

The Lamps of Palmer are likewise en-
titled to our particular attention. By
causing the Rays to pass thro' a Lignicoloured
blue; he perfectly imitates the
light of the day; which proves that the
Artificial Rays require to be mixed
with the blue, to imitate the Natural
and the Solar Rays which pass thro'
the atmosphere, may owe their Colour to
their combination with the blue colour

which appears to predominate in the
Air —

The Medicinal Soap is made by
with Ol. Amyg. & $\frac{1}{2}$ its weight of Pot
ash the Mixture concentrated by fire.

To make the Soap of Commerce — one
part of good Soda of Alicante must
be boiled with two of Quicklime in
a sufficient Quantity of Water. The
Liquor is then to be strained thro' a
Cloth; and evaporated to that degree
that a phial which contains eight
of pure Water, may hold eleven of the
saline solution, which is usually
called Soap Lye or Lees. One part
of this Lixivium & 2 of Oil, boiled
together, till upon trial with a
Spatula it easily separates, and
soon coagulates, form Soap.

Camphor

Is obtained from a Species of Laurel
which grows in China and Japan —
The Roots are usually chosen & it is
procured by distillation from the

roots of thyme — Sage &c. — Peppermint also
and fennel

Concerning Annish

It is afforded by a tree in China —

The Chinese use the oil of Tea, which they
render drying by boiling it with opium
Tealger & Arsenic —

^{Fecula of Vegetables}
The Pith of Palm is mixed with water
then dried. ~~it is used in various ways to powder~~
and forms small grains — The fecula
of Salep forms a very nourishing Jelly —

Concerning the Calculus of the bladder

He considers it a substance intermediate between
Tartar & Stone, which he calls *duelach*. —

The Nitric Acid dissolves it. I have seen
a calculus with a large plum Stone in the
Centre —

Phosphorus

Kunkel discovered it in urine —

Concerning the Products afforded by
Quadrupeds - Castoreum

Is an unctuous fluid contain'd in two
pouches situated in the inguinal Region of
the male or female Castor —

Musk

It was obtain'd from an animal called the
Musk Animal from Africa & resembles the Civet
the organ which contains the Musk was
situated near the genital parts - it is pre-
sented by two glands - The other animal
which affords Musk in the East, is of the
Class of Squirrels it is very common in
Chinese Country. it carries the Musk in
a bag beneath the Navel. —

Products of Insects

Cochinilla is an animal collected upon plants
~~to which the~~ in Mexico called Indian Fig &c.
kind of cactus of the fruit of a Juniper Berry

Acids extracted from the Animal
Kingdom - acid of Millepedes, of ants,
Silkworms. -

Concerning Putrefaction

Examination of Mineral Waters. -

200
ules are small vessels or Repo-
sitories which contain the Pith, and frequently
of Matter. -
201

a bag beneath
Products of

Cochinilla is an unusual
~~to which the~~ in Mexico cal
kind of cocciferous

Part the 4th
Concerning Vegetable Substances.

Concerning the Structure
of
Vegetables.

Article I

Concerning the Bark.

Epidermis -

Art. II

Concerning the Ligneous Texture.

Three kind of Vessels may be distinguished
in Vegetables: The Common or Sap Vessels;
the proper Vessels; and the Air Vessels or
Tracheae -

The Utricles are small Vessels or Repo-
sitories which contain the Pith, and frequently
the colouring Matter. -

Glands are small protuberances observed upon various parts of Vegetables.

Concerning the Nutritive Principles of Vegetables

Concerning Water, as a Nutritive
Principle of Plants. —

Concerning Earth, and its
Influence in Vegetation. —

Vegetables almost entirely formed
of Hydrogene —

Vol. III

Concerning Nitrogen Gas, as a
Nutritive principle of Plants —

Dr Priestly, Ingenhousz, and Mr
Senebier, have proved that it is the
Nitrogen Gas which more particularly serves
them as Aliment. —

24p

kind of cacumene

Concerning Carbonic Acid as a
Nutritive principle of Plants.

Concerning Light, and
its Influence on Vegetation.

The Property which Plants Possess
of converting Nitrogenous Gas and
Carbonic Acid into nourishment,
establishes an astonishing degree of
Analogy between them and
certain insects.

See viii

Concerning the Results of Nutrition,
on the Vegetable Principles. —

Concerning Mucilage

It forms the Basis of the proper juices
or the Sap of Plants —

2. How many gums are there?

A. Three, 1. Gums of the country

2nd Gum Arabic - it flows naturally from the acacia in Egypt & Arabia

3. Gum Adragant - it flows from the Adragant of Cete a small shrub not exceeding three feet in height -

Concerning Oils

Concerning fixed oils

olive oil is obtained by expressing from the fruit of the olive tree -

oil easily combines with oxygen

Mucilage may be considered the Seed of germination

To make Soap - 1 lb. Soda

2 of Quackline boiled in water the Liqueur to be strained and evaporated

2nd
To that degree, that a Phial which
contains eight of Pure Water
may hold eleven of the Saline
Solution - 1 part of this Solution
and 2 of Oil, boiled together, till
upon Trial with a spatula it
easily separates, and soon coagu-
lates firm Soap -

Concerning Volat: Oils -
as Lavender Mint &c

Camphor

2, How and when is it obtained
A. From a Species of Laurel which
grows in China and Japan.
By distillation - The Roots are
generally chosen and water
added they are put into an Alembic
and distilled &c. —

It is also obtained from Ledoary
Thyme &c — Sage &c — Pepper-
Mint

The Hollanderis purify Camphor
by mixing an ounce of Quick-
silver with every pound of the
substance, and subliming it
in large glass Vessels —

Camphor is no doubt one
of the Constituent principles
of some Volatile Oils. — But
it is in the liquid state, and
does not become concrete
but by combining with
Oxygen. —

Camphoric Acid dissolves
Copper, Iron, Bismuth, &c.

Concerning Resins.

The Balm of Mecca flows from
incisions made in the Amyris
Opobalsum. Called sometimes
Balm of Judea. &c. is a
Terreous Juice obtained from an
ever green tree —

Balsam Copahu flows from
a Tree called Copaiba in
South America Near Soler.

Turpentine collected from the yew
leaved fir in the Mountains
of Switzerland. —

Bayberry Pitch obtained
from a Tree named
Epicea —

Lamp-black is the soot of
burned Pitch —
Dragon Blood is obtained from
the

the Drakenor in the Canary
Islands — it is a Toxicom
Substance —

Concerning Balsams

There are three kinds —

viz Benzoin, Balsam of Tolu
and Storax calamita —

1 Benzoin is a juice of a pleasant
fragrant pine — 2 Kinds — Benzoe
amygdaloides, and the Common
Benzoin. It comes from the
Kingdom of Siam, and the Island
of Sumatra; Sublimated it forms
flowers of Benzoin — The juice
comes from a Tree we are not ac-
quainted with. —

The Acid of Benzoin

Is used as an Aromatic in Medicine

Storax Balsams of Peru & Tolu extracted
from Plants — a Plant growing
in S. America

Concerning Gum Beesing 3rd

Olbanum - it is used to disguise
bad smells it exudes from the Bark of
a tree in the East Indies - (Juniperus Lycia)
Scammony - from Aleppo and the
other from Smyrna - is a useful
Purgative - (Convolvulus Scammonia) is extracted
from the roots of a large climbing tree growing
in Asia -
Asa-Fetida - a stinking substance
obtained from a plant called
Ferula Asa-fetida - growing in
Persia -

Aloes - 3 kinds - Succosh. Aloes
from Socotrina in the Indian Ocean
Hepatic ^{or Sarcocolla} and Colaline - inspissated Juice
from certain plants of the same Name
Gum Ammoniac - Comes from
the Deserts of Africa & Abyssinia - it
is extracted from the species of ~~ferula~~ plants
Ferula - Elastic Gum -

It is obtained from a Tree called
Seringa by the Indians of Para.
it is used for Illumination instead of
Candles.

Concerning Mannik—

Is obtained from a Tree in
the East Indies by incisions
called thus toxicodendron.

Concerning the Fecula
of
Vegetables.—

Potatoes - Lago, Salep, Bayong,
Cassava.

Lago formed from the pith of
Middle aged Palms.—

Salep formed from the Bulbs of
all the Kinds of Orchis—

Concerning the Vegetable
Gluten—

Concerning Sugar—

Is afforded by Sy Maple, Birch,
Wheat and Turkey Corn. From, Beet
Parsnips &c—

The juice of the cane is boiled and
summed in three several boilers
in this state it is called Symp.
and it is again boiled with
lime and alum till it is
sufficiently concentrated and
poured into a Vessel called a
cooler - In this Vessel it is
agitated with wooden Stirers, in
break the crust as it forms on the
surface. It is afterward poured
into Casks, to accelerate its Cool-
ing and while warm conveyed
into Barrels -

Acid of Sugar -

Concerning the Vegetable Acids.

Concerning Alkali

Chromocac is found in Plants -

Concerning the Colouring
Principles —

Concerning the Pollen,
or fecundating Powder of the
Stamina of Vegetables,

Concerning Wax
It is merely the Pollen very little
altered —

Concerning Honey.
It is contained chiefly in
the Base of the Pistil —

Concerning the Ligneous
Part of Vegetables. —

Concerning other fixed Principles
of the Vegetable Kingdom.

2th

Of the Common Juices extracted by
Incision or Expression. —

Concerning the Juices
Extracted by Incision. —

Manna. — Extracted from the pine,
fir, maple, oak, Juniper, fig,
Willow, olive &c. — But the
Ash, Larch, & afford it in largest
quantities. — it grows in
Calabria, Sicily, &c. —

It affords by Distillation Water, Acid,
Oil, and Ammoniac, and its
Coal affords alkali. —

Opium. — afforded by the Poppy which
is Cultivated in Persia, Asia Minor
&c.

The Aroma of Opium a Sedative
 Principle is a Medicine of the greatest
 Value, because it does not produce
 that Drunkenness and Stupor which
 are too commonly the effects of Cude
 Opium. ^{4 lbs common Opium afford one lb}
^{1 1/3 of Mace or insoluble Matter 1 lb 15}
^{ounce of extract 12 3 Resin 13 of Salt - 3 3 gro}
 Concerning Vegetable Juices

Extracted by Pressure.

Concerning such Principles as escape
 from Vegetables by transpiration.

viz, Air, Water & Aroma.

Concerning Oxygenous Gas
 afforded by Vegetables.
 Dr Ingenhousz affirms that Plants
 emit Vital Air when acted upon
 by the direct Rays of the Sun. And

that emit a very mephitic Air in
the Shade, and during the Night.
The Parenchyma of the leaf appears to
be the part which emits the Air.

Concerning the Water afforded
By Vegetables. —

Concerning the Aroma
or
Spiritus Rector. —

It is of the Nature of Gas.

Inghouze quotes an Instance of the
Death of a young Woman occasioned
by the smell of Lillies —

The Mancinelle Tree of W. India
is poisonous —

... with a black viscidulous Matter.

Concerning the Alteration to which Vegetables are Subject after they are deprived of Life. —

Concerning the Action of Heat Upon Vegetable Substances.

Vegetables afford — Water, oil Acid, Salt and Coal —

Charcoal is very indecomposable Combined with oxygen it forms the Carbonic Acid. —

Concerning the action of Water singly to Vegetables.

The Extract of Liquorice is prepared in Spain by decoction of the Shrub of the same Name —

7th
in

Concerning Pit. Coal

The Petroleum discharged from Coal
forms Tar —
or a Variety of Petrolum —
Naptha — there is a place known
by the Name of perpetual Fire
The Indians do not attribute
the origin of this inextinguishable
fire to Naptha — but they
maintain that God has confined
the Devil in this place, to deliver
Man from him —

Amber is found floating in the
Baltic Sea, on the Coast of Ducal
Prussia —

It is found dispersed over Strata
of Pyrean Earth abounding
with a black bituminous Matter.

The Succinic acid—

Concern^d Volcanos

Concerning the Decomposition of
Vegetable, in the Bowels of the Earth

Concerning the action of air
and Heat upon Vegetables.

Concerning the action of air and
Water, which determines a Com-
=mencement of fermentation that
separates the Vegetable Juices
from the Ligneous Part

Concerning the action of Air, of Heat
and of Water upon Vegetables.

The conditions necessary for the establishment of fermentation are

1. The Contact of pure air
2. A Certain degree of Heat
3. A Quantity of Water more or less considerable which produces a Difference in the effects.

The Phenomena which essentially accompany fermentation

- are - 1 The Production of Heat
2 The Absorption of Oxygenous Gas —

Two kinds of Leaven may be distinguished —

1 Bodies eminently putrescible the Addition of which hastens the fermentation.

2 Those which are already abound with oxygen. —

Concerning the Spiritous Fermentation
and its Products. —

Pure Sugar mixed with ^{Water} ~~Saffier~~
or ~~Rum~~ ^{Taffia} forms Rum by fermentation

2. What is required in the Development
of this fermentation?

A — 1 Access of air

2 A Degree of heat between
10 & 15 of Reaumur —

3. The Division and expression
of the Juice contained in the
Fruits, or in the Plant.

4 A Mass or Volume some-
what Considerable.

6th
m

The Juice of Grapes by evaporation forms
Wine as Apples form Cyder.

Pears form a kind of Cyder called
Perry.

2. How is Wine usually decomposed?
A. By Distillation

2. By what Name is the first product
of this Operation known?

A. Brandy.

2. How is Spirit of Wine or Alcohol
formed?

A. By the distillation of Brandy.

It seems to be formed by the intimate
Union of much Hydrogene and Carbone.

Spirit of Wine Combined with oxygen
forms a Liquid nearly insoluble
in Water, which is called Ether.

2. How is it made?

A. By putting Alcohol and an
equal weight of Concentrated
Sulphuric Acid into a Retort.

The Retort placed on a Sand Bath
a Receiver is adapted and the
Mixture heated to Ebullition—
Alcohol first passes over; soon
after which Streams of fluid appear
in the Neck of the Retort, and
within the Receiver is denoted the
Rising of the Ether— If the Distillation
is continued Aethereal oil is formed

Concerning Tartar.

It is deposited on the Sides of Casks during fermentation. —

2. How is the Acidulous Tartrate of Pot-ash formed?

A. By boiling the Crystals of Tartar with white Argillaceous Earth and After this boiling a very white Salt is obtained by Evaporation, known by the Name of Cream of Tartar or acidulous Tartrate of Pot-ash.

Concerning the Acid Fermentation.

3 Causes Necessary to produce Acid Fermentation — VV.

1. The Existence of Mucilage
2. A Degree of heat between 18 & 25 of Reaumur
3. The presence of oxygenous Gas.

Distilled Vinegar
Acetate of Potash

The acetic Acid is capable of combining with a stronger dose of Oxygen; and then forms Radical Vinegar or the Acetic Acid.

Concerning the Putrid fermentation

Part 6th
Concerning Animal
Substances.

2. Has not the Chemical art marked
the Limits between vegetable and
Animal Substances?

A. Yes these last afford ammonia by
putrefaction, while the fermentation
of the former develops Acid Spirit.
The latter leaves a Coal which burns
easily; while the former become
Converted into a Coal almost
Incombustible — Animal Matter
Contains much Nitrogen ~~is~~ may
be disengaged by means of Nitric Acid.

Concerning Digestion. —

That Humour which is known by the
name of the Gastric Juice, is Secreted
by Glands placed between the Membranes which
line the Stomach.

2. According to the Observations of
Messrs Spallanzani and Goffe does
not the Nature of the gastric Juice
vary according to that of the Ali-
-ments?

A. Yes; This Juice is constantly
acid when the Diet is vegetable.

Messrs Jurine, Toggia, and Caminati,
have made the most successful
Applications of the gastric Juice in
the Treatment of Wounds.

In the gastric Juice of Carnivorous Birds
a disengaged acid a Resin & an animal Substance
Concerning Milk.

Lactic acid—

Chap. III.

Concerning the Blood.

In the distillation of Blood. The product
is Acid, oil, Carbonate of Ammoniac

A Spongy Coal Remains in the Retort
of very difficult incineration, in which
are found Sea Salt, Carbonate of
Soda, Iron and Phosphate of Lime.

Alcohol and the acids coagulate Blood.
Alkalis render it more fluid.

Serum of yellowish green Colour.
Coagulated by heat, acids &c.

The fibrous part it contains much
Lymph.

Blood contains much Iron ~~and this~~
and the Colour of the Blood appears
to be entirely formed of it — as
~~Oxygen~~ alone is absorbed in Respiration
it appears that the Colour is owing to
Iron Calined by the pure Air and reduced to
the state of Red Oxide. —

Concerning Fat
Sebacic Acid —

Concerning the Bile

Bile is a soap resulting from
the combination of Soda with
a Matter of the Nature of Resins
and a Lymphatic Substance
which renders it susceptible of
putrefaction and Coagulation.

The Acids in act on the Bile in
the first passages decompose it
as in the Excrements of Infants. —

Excellent
Internally used as an Ulcerary
Internally — a good Stomachic
and one of the best deobstruents.
The Art of Medicine proposes.

2nd
"

And bile is a proper Medicine
when the Digestion languishes, or
the Viscera of the lower Belly are
Clogged.

Concerning the soft and white
Parts of Animals.

Isinglass made of the mucilaginous
parts of a large fish commonly
found in the Russian Seas.

Concerning the Muscular
or
fleshy Parts.

Concerning Urine.

In a natural state, is transparent
of a Citron Colour, &c a Saline
Taste. &c.

Urine in its natural State is
a Water holding in Solution
matter purely extractive as
Phosphoric or Muriatic Salts.
These Phosphoric Salts have
Lime, Ammoniac, or Soda,
for their Basis; we shall take
~~a flight View of each in par-~~
~~ticular~~

Concerning the Calculus
of the Bladder—

Paracelsus thinks it absolutely
similar to the Matter of the
Gout.

It contains Ammoniac

It contains an Acid called
Lithic Acid—

Concerning Phosphorus.

To make Phosphorus -

Take - Muriat of Lead
10 lbs of the Extract of Urine
of the Consistence of honey.

$\frac{1}{2}$ lb in Charcoal is added

The Mixture is dried in an oven
not untill it is reduced to a
black Powder. This powder is
to be put into a Retort: and
the Vol: Alk. the fetid Oil
and the Sal. Ammon. distilled
off - The Residue contains
the Phosphorus. -

It is of a flesh Colour, and evidently
transparent. It has the Consistence
of Wax and may be cut in pieces
with a Knife. it is luminous
in the dark -

Phosphoric Acid formed by the
Combination of Phosphorus with
oxygen.

Concerning the Products
afforded by Quadrupeds.

Castor, Musk and Hartshorn
is an unctuous fluid
Castor found in the Groin of y^e Castor
female - it is a Resin joined
to a Mucilage, and a Salt which
facilitates the Union of its principles

Musk. The Animal Resembles the
Civet. found about y^e Genital
Hartshorn. from Horn by distillation

Concerning Certain Products
afforded by fishes. —

Hermaceti

Concerning Certain Products
afforded by Insects —

1 *Cantharides* — found on the
leaves of the ash, Rose Tree, &c.

Cochineles — is collected in Mexico
upon Plants which bear fruit
resembling figs — The Indians
saw as it were on the leaves
the little insects called *Cochineles*

Acid of Ants—
Acid of Silk Worms

Concerning Putrefaction.

Concerning Mineral Waters

Sulphureous Water known by
the smell of Rotten Eggs which
they emit.

Martial ~~Liquors~~ Water—

These have the property of ex-
hibiting a blue colour by
the solution of Prussiate of
Lime: they have besides a
very evident Astringent Taste.

There are two things to be considered
in the Analysis of Vegetables.

1. The Volatile principles
2. The fixed principles

The Vol. Principles are Carbonic
acid Gas and Lepetic Gas.

Lepetic Gas may be precipitated
by the very concentrated Nitric
Acid —

Carbonic Acid Gas precipitated
by Lime Water —

The Fixed principles ascertained
by Evaporation. —

2. What in fact is a Mineral Water?

A. It is Rain Water, which, filtering thro the Mountains, becomes impregnated with the various soluble principles it meets with.

(1)
Acacia vera / *Mimosa nitida*
It is brought to us from the ~~E. Indies~~
Egypt. it is the inspissated Juice
of the unripe fruit of a large tree
the same is produce the Gum Arabic.
It is a mild astringent Medicine.

Aconitum napellus Lin / *Aconitum*
from a perennial plant growing
in Mountainous parts of Europe
It is one of the most active vegetable
poisons - Dr. Stoerck recommends
it in glandular swellings &c -

Agaric Touchwood or Sprunk.
the fungus of the Oak.

Agrimony - / *Agrimonia eupatoria* /
A Common plant in hedges and the
Borders of fields

Angelica - is a large umbelliferous
plant - it is an elegant
aromatic -

Aristolochia - Aromatic

Arnica - German Leopard
Bane - This plant grows in
Germany - ~~Aromatic~~ - it is
recommended in Paralytic
affections - it is very powerful
Dr. Collins of Vienna wrote on
it - it has an acid bitter
taste and exerts freezing -

Asarum -

Belladonna - Nightshade -

Benzoë - from a Tree in the Island
of Sumatra -

is a low plant
Betony - growing in Woods and shady
places in England. -

Berzoar Stone -

Bryony Root - of a rough plant -
It is a drastic purgative.

Bugloss -

Cajeput - from the fruit of the
Malecula Leucadendron -

Caryophyllata - Avena the Root -
It has a warm, bitter, astringent
taste - is said to cure Intermittents

Cascarilla - is a Bark employed
in Cure of Intermittents - Aromatic
& fragrant. -

Cassia Fistularis — It is
the fruit of an Oriental Tree. —
is gently laxative

Cassia lignea — from E. Indies —
Resembles Cinnamon is obtained
from a species of the same tree. —

Castor —

Catechu or *Lacca Japonica* is
the product of a plant growing in
the E. Indies. — is a powerful
Astringent. —

Cichorium or *Succory* — is
excellent in Cutaneous affection
The Root and Herb.

Cicuta ^{or Hemlock} — a large umbelliferous
plant —

(2)

Cinnabaris nativa

Colocyathis - is ^{the} produce of
a plant of the Gourd Kind.
~~the fruit is~~ ^{growing in Turkey} The fruit is
about the size of an orange
its medullary part freed from
the Rind and Seeds is alone
made use of in Medicine. - it is
very bitter & nauseous - it is
powerfully Cathartic.

Colomba - Comes from Colombo in
Ceylon.

Contrayerva is a Root of an
aromatic flavor - is a good dia-
-phoretic. -

Crocus - Saffron aromatic -

The seed of the wild Cucumber
is called *Elaterrum* is powerfully
Cathartic. in doses of only 2 or 3
grains - used very much in the
Cure of Dropsies

The fruit of the wild Cucumber
is not bigger than a Spanish
Olive - wild Cucumber is found
wild in some Countries. -

Turmeric - Comes from E. India
bitterish taste is esteemed aperient
and Emmenagogue. -

Digitalis. Fox Glove - The
Plant grows wild in Woods
and uncultivated Grounds -
it bears an elegant purple flower.

Galbannum - is the Concrete Juice
of an African plant is agreeable
Virtue with Gum Ammoniac.

Gamboge a solid Concrete
Juice brought from the E. Indies

Geoffrea inermis - Cabbage Tree
grows in W. Indies - is used
for the expulsion of the Lumbrici.

Guaiacum - from a Tree growing
in the W. Indies -

Gum Tragacanth from a Thorny
Bush growing in Crete

Hyoscyamus - This vegetable
grows common in Britain
it belongs to the natural
Order of the Solanaceae. Comprehending
the greater part of the Narcotic
Vegetables. - used in Mania
Epilepsy &c -

a Specie

Pyrotia Enetica - Is bot from
Spanish W. Indies - 2 kinds
Peruvian & Brazilian -
is a Root of the *Pyrotia* -

Kino - a vegetable astringent

Lichen - Liverwort - This ^{Plant}
grows in America - it is a
warm Diuretic - Been used
for the Hydrophobia -

Lobelia - ^{this plant} grows in moist places
in Virginia - it is used by the
North American Indians in
the cure of the Venereal -

Gum Mastick - used in Old Coughs.

Mezerion - it is a native of Europe
bears elegant white flowers.

G. Myrrh - is brought from E. Indies

Nux Vomica the produce of
a Tree growing in the East
Indies - is said to be a specific
against the bite of a Snake - it
is bitter and deleterious - has
been used in Intermittents &
Dysentery.

G. Opoponax -

Peony - this plant grows common

Palma - it affords an oil

Pariera brava - An American
Plant - used in suppression of
Urine -

Peruvian Bark - The Tree is
about 15 feet high & 6 Inches
thick

Rhabarbarum - This plant
which is of the Dock Kind grows
spontaneously in China -
2 Sorts - Turkey and Russia -

Ricinus - Palma Christi -
The seeds are nuts about the
size of small Beans. -

Sagapenum - concrete Juice
brought from Alexandria -

Sanguis Draconis - is a Gummi
Resinous substance got from
the E. Indies - it obtained from
several Vegetables

Sassafrilla - this Root is
got from W. Indies -

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Scammony a concrete Juice
of a large Climbing Plant
growing in the Asiatic Turkey.
powerful purgative —

Senna a shrubby plant
Cultivated in Persia —

Spigelia - Marilandica —
Indian Pink. —

Spongia Sponge

Stramonium Datura —
Thorned Apple — is a shrubby
plant considerably smaller
than the Lavender — powerfully
narcotic has been used in Mania
Epilepsy &c.

Serena. an odoriferous Resinous
substance exuding from a Tree
growing in Warm climates

Amber. dug out of the Earth
and floats on the Sea shores.

Uva Ursi Bears whortleberry

Winteranus Cortex = discovered
in America by Capt. Winter
good for Scurvy.

Lithology

Part II No 1

Q. What do you mean by Lithology?

A. The Study of Earths and Stones.

Q. What do you mean by a Stone?

A. Heavy, brittle, inodorous, insipid Substance. —

Q. What are the earthy elements most extensively distributed?

A. Lime, Magnesia, Barytes, Alumina and Silica. —

Q. How many Classes to be distinguished in Lithology?

A. Three — 1st will comprehend Saline Stones — 2nd Stones properly so called or earthy Mixtures; 3rd Rocks or Stony Admixtures. —

Mr. De Moiré has substituted the precipitate of Lime to white Lead with the greatest advantage. 725

Lime

2. How may Lime be obtained in the greatest purity?

A. Chalk is to be washed in boiling distilled Water, then dissolved in distilled acetic acid, and precipitated by the Carbonate of Ammonia or mild Vol. alk: — The precipitate being washed and calcined is pure Lime.

Barytes or Ponderous Earth.

The Precipitate of Pot-ash or Potash alkali precipitates it from its Combination with the Nitric and Muriatic Acids —

Magnesia or Magnesian Earth

2. How obtained?

A. The Crystals of the Sulphate of Magnes. or Epsom Salt are to be dissolved in distilled Water, mixed

decomposed by the Carbonate of
Alkali — The precipitate must
then be calcined, to disengage the
Carbonic Acid. —

Plumbeous or pure Clay

Silex, or Quartzose Earth, Vitriifiable
Earth &c. —

It exists in a State of purity
nearly in Rock Crystal.

The fluoric Acid dissolves it —

Concern? the Combination of
Earths with Acids.

This Class which Comprehends the
Combination of primitive Earths
with Acids, naturally exhibits 5
Genera —

The characters of the Carbonates of Lime

1. They effervesce with acids
2. They are converted into lime by calcination —

Carbonat: of Lime
or
Calcareous Stone

Exists in two principal States

1. in form of Crystals, or of irregular Masses. —

1. Crystallized Calcareous
Stones —

They consist of from 34 to 36
parts of Carbonic Acid and from
53 to 55 of Earth. — the rest is
Earth. —

No 2

Calcareous Stones which are
not Crystallized. —

Marble Coloured by Bitumen or
Iron. Mr. Bayan found this Metal
in the Proportion of 5 parts in the hundred

Calcareous Earth, filtered thro' Rocks
forms those Incrustations known by the
Vulgar under the Name of Petrifications
and by that of Stalactites among
Naturalists. —

The Analysis and Uses of Calcar-
eous Stone. —

* Calcareous Stones deprived of a peculiar
Air, which they possess different from
Atmospheric Air / form Lime —

~~1st By fire 2nd By Acids~~
Lime — Decomposed 1st by Fire — 2nd By Acids

2. What are the Characters of the best Lime?

A That which is the most quickly dissolved by immersion in Water, and affords the greatest Quantity of Heat in this process which Causes it to fall into the finest powder. —

Lime Water is used to indicate the presence, and determine the proportion, of Carbonic Acid in any Mineral Water. —

Sulphat. of Lime, Gypsum, Selenite
Plaster Stone &c.

The Plaster Stone loses its Transparency
By Calcination —

2. What is the Colour of Gypsum?

A. Sometimes White sometimes Grey. —

Spec³ III

Fluate of Lime, Vitreous Spar, Fusible or phos-
-phoric Spar, Fluor Spar. —

2. What form the Stone?

A. This Stone is a combination of a peculiar
acid, called the fluor acid with Lime.

It decrepitates on heated coals, like
Muriat. of Soda or Common Salt

This Spar enters into fusion by a strong
Heat, and Corrodes the Crucible. —

It possesses the most lively and various
Colour — Called false emerald,
false Emethest, or false Topaz,
According as its color is green,
Violet, or Yellow. —

When this Stone is distilled with its own
weights of Sulphuric Acid, the first product
consists of elastic whitish Vapors, which fill
the Receiver, and deposit a crust at the Surface
of the Water, while the Water itself becomes acidulous

The Residue in the Retort is sulphat
of Lime according to Scheele. The
crust which is formed on the Water
of the Receiver is siliceous Earth,
and the Water itself being saturated
with the Vapor, constitutes the
fluoric Acid. —

Q. Has not the fluoric Acid some
Analogy with the Muriatic?

A. Yes, — But they notwithstanding
differ very essentially, — The fluoric
acid possesses the very singular
property of attacking Glass, and
dissolving and carrying off its
siliceous part. — Klaproth has
very happily applied it to the art
of engraving on glass —

Nitrate of Lime, Calcareous Nitro.
Muriate of Lime, Calcareous, Marine
Salt—

Q. When Does this Combination exist?

A. In the Waters of the Sea. and contin-
 -ues to give to these Waters that bitter
 taste which has improperly been referred
 to Bitumens that have no existence—

It acquires by Calcination the property of
 shining in the dark, and is called the
 Phosphorus of Homberg—

Q. How is it decomposed?

A. By Barytes and the Alkali—

Q. Does not the Concentrated Sulphuric
 Acid, poured upon a very strong
 Solution of Muriat: of Lime, disengage
 the Acid in Vapours and form a
 solid precipitate—

A. Yes, an appearance which seems in an instant to transform two liquids into a solid, and produces a very striking effect. — The theory of this Phenomenon is easily deduced from the very great solubility of the Muriate and the almost absolute insolubility of the Sulphate which takes its place.

Phosphate of Lime, Calcareous
Phosphoric Salt. —

It is found in Spain, in the Kingdom of Estramadura, —

Genus II

Earthy Salts with Base of Barytes

Q. What is the most common state in which Barytes is found?

A. In Combination with the Sulphuric Acid.

Sulphates of Barytes Ponderous Spar.

2. Is not this Stone the most ponderous we are acquainted with?

A. Yes.

Q. Does it not accompany metallic ores?

A. Yes, and is considered as an happy presage of finding them. —

Carbonate of Barytes

Nitrate of Barytes —

Muriate of Barytes

Gen. III

Earthly Salts with Basis of Magnesia. —

Spec¹ - 1st

Sulphat of Magnesia or Epsom Salt.

2. Where is this Salt met with?

A. In several mineral Waters,
such as those of Epsom, Sedlitz &c.

It is known by the Name of
bitter Cathartic Salt. on account
of its Name and Virtues. —

It comes from the Salt Works
in the environs of Harbours
where it is extracted from the
Mother Waters which contain
it abundantly. —

Sulphate of Magnes

Muriat: of Magnes:

Carbonate of Magnes:

~~It is a Carbon~~

2. Is not Carbonat. of Magnesia used
in Medicine as a purgative?

A. Yes — But the Calced Magnesia ought
to be preferred as an Absorbent.
Fire carries off the Water & the acid: and this State

No 4

is called Calcin'd Magnesia. —

Gen: IV

Earthy Salts with Base of
Alumine —

Spec. I

Sulphat. of Alumine or Alum.

Q. How is it formed?

A. By Combining the sulphuric Acid
with pure Clay. — Most of the
Alum in Commerce is afforded by
Ores which are dug out of the Earth
for the Purpose. —

Alum is the Soul of the Art of Dyeing
and serves as the Mordant of all
Colors. It is used to prepare
leather, to impregnate paper and
cloths intended to be printed

Carbonate of Alumine

Gen: V

Earthy Salts with Base of Silice

Silica of all the known Earths combines most difficultly with Acids. we are acquainted with no Acid but the Fluoric which exerts an evident action on it —

Concerning the Combination and Mixture of Primitive Earths or Earthy Mixtures. —

Calcareous Mixtures.

Spec. Ist

Lime Stone & Magnesia

Spec. II

Lime Stone and Barites —

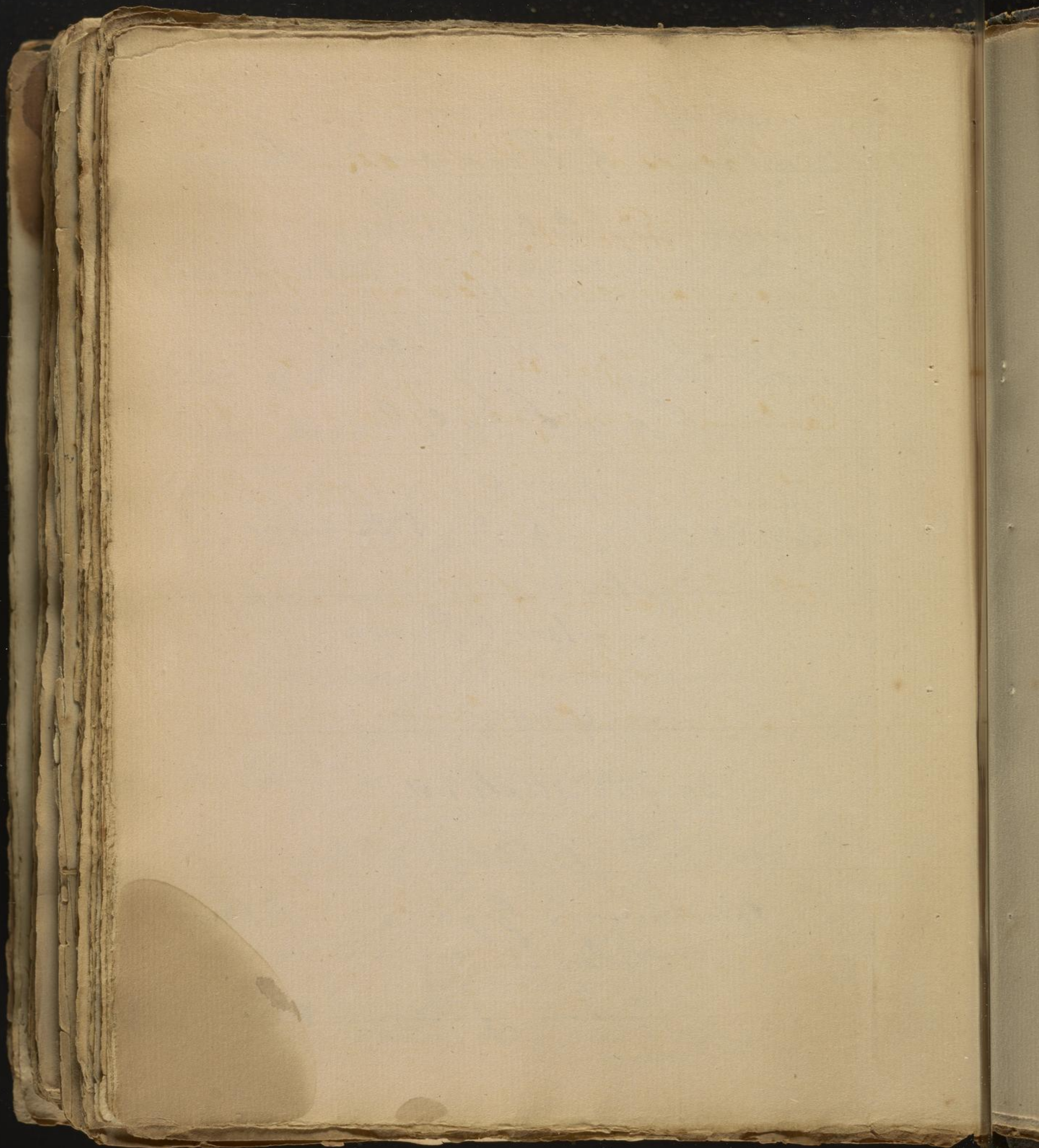
Spec III
Carbonate of Lime and Murrine
Commonly Called Marble.

Spec. IV
Lime-stone and Silice -
L^{or} Schocel

Spec. V
Lime-stone and Bitumen
Sp. 6
Lime-stone & Iron -

Ch. 2nd
Barytic Mixtures

Spec: 1st Sulphat. of Barytes
Petroleum. Gypsum Alum
and Silice -
Carbon. of Baryt. Silice
and Iron -



Gen III

5

Magnesian Mixtures. —

Spec. I.

Pure Magnesia, Silica and Alumina.

Spec II

Carbonat. of Magnes. Silica and Alumina

These mixtures form talcs Steatites
&c.

The Soap Stone of China is a Steatite

Spec III

Pure Magnes. combined with Silica
Alumina

Spec IV

Carbonat. of Magnes. Silica. Lime
Alumina and Iron.

Asbestos

This Stone is greenish —

Mountain Cork

Spec V

Carbon of Magnes. & Lime, Sulphat
of Baryte, Alumine & Iron. —

It forms striae in the.

Gen VI

Aluminous Mixtures

Spec' 1st

Alumine, Silica, Carbonate of Lime,
and more or less of Iron.

The Glazes of Pottery are made
of lead ore called Argunfous
made into powder & mixed with
Water the Vessel is dipped into
it absorbs a portion it then baked
and the Glaze become, Vitrified —

The fine white Enamel of Potters

100 lbs Lead

30 Tin

10 Marine Salt

102 Purified P. ash - Calined together

and used as before mentioned —

The finest Pottery is known by the Name
of Porcelain —

Q. Where were they first Manufactured

A. In Japan and China. —

Q. Who sent the substances used in the
fabrication of Porcelain from China?

A. Father Dentrecolles.

Q. By what Names are they known?

A. By the Names of Kaolin and Petunse.

Q. How many Operations may be distin-
-guished in the Manufacture of Porcelain?

4. form. — 1 The Mixture of Earth,
and working of the paste —

2. The first Baking which forms
the Biscuit —

3. The Application and fusion of the
Glaze and Covering.

4 The Art of Painting, which de-
mands a third Baking, in order that
the Colors may be better Combined, fused
and amalgamated with the Glaze. —

Spec. #

Alumine, Silica, Pure Magnesia
and Iron forms Mica.

Vari. "I

Black Horn Stone, Lapis Cornuus
Niter Walleris

Vari. #

Horn Stone of a greenish grey colour.
or
Pale Green Horn —

Spec 'IV

6

Alumina, Silica, Carbonat of Magnesia
and of Lime with Iron — this
comprehend the Slate —

Var: I Bluish purple Slate

Var II Black Slate —

Var "III Blue Slate

IV pale color

Spec: V

Alumina, Silica, Pyrites, Sulphure
of Iron and Carbonate of Lime and
Magnesia —

Spec: VI

Alumina, Silica, the Carbonates of Lime
and of Magnesia, the Sulphure of Iron
and Bitumen. — forms Volcanos —

Spec: VII

Alumina Silica Lime & Water
forms what
is called Zeolite —

Gen^o
Precious Mixtures -

Spec. I

Silex, Alumine, Lime & Iron intimately
Combined - form the precious Stones or
Gems -

Red Gems - Ruby Garnet &c.

Ruby the most wonderful and hardest
of the precious Stones - Flame urged
by Vital air fuses it - as also the
Borate of Soda -

Garnet of a Yellow Red -

Division II

Yellow Gems or precious Stones -
The Topaz, The Hyacinth &c -

The Topaz is of a Gold Color -

Hyacinth of a Reddish Yellow Color

Divisⁿ III

Green Gems - the Emeralds, Chrysolite,
Beryl &c - some in America

Divisⁿ IV

Blue Gems Sapphire
Sapphire is Sky blue -

Spec^s II

Silex, sometimes pure, but oftener mixed
with a very small quantity of
Alumina, Lime & Iron. -

Divis I

Rock Crystal

Variety I

Red Crystal - False Ruby
Yellow Crystal - Bohemian Topaz
Brown Crystal - Smoky Topaz -
Green Crystal - False Emerald
Blue Crystal - Water Sapphire -

Violet Crystal - The Amethyst.

Division II

Quartz -

Spec. III

Siles, Alumine, Lime and
Iron intimately mixed -

Divis. I

Coarse Flints -

Divis. II

The finer Flints -

1. Agate - Chal - Jasper come
from Egypt
Calcedony - Cacholong -
Carnelian, Sardonyx.

Spec. IV

Siles, Alumine, & Iron -
Jasper -

Spec' IV

Silex Silumine and Iron.
Jasper which ^{forms} is one of the hardest
Stones we are acquainted with.

~~Silex Silumine and Iron.~~

Spec' V

Silex, Silumine, Lime with a
small portion of Magnesia and
Iron. —

I The Tourmaline —

II Schorl

1 Black Schorl

2 Green

3 Violet

4 White all these found
in Mountains of Pyrenees —

III Volcanic Products are Basalt
Lava & Terra Pozzolana. —

The Hardest Basalt affords the
Most beautiful Glass—

Spec' vi
Silica, Lime, Magnesia, Iron, Copper
and the Fluoric Acid. —

This combination forms the
Chrysoprase. —

Spec' vii
Silica, The blue fluuate of Lime,
with the Sulphate of Lime and
Iron. — forms Lapis Lazuli
or Azure Stone —

Sp. viii
Silica, Alumina, Barytes and
Magnesia. — Called Feld Spar —

Class III
Concerning the Mixtures of Stone
among each other — Rocks &c

Gen I

Rocks formed by the mixture of
Calcareous Stones & Mord Spec?

Spec I

Carbonate of Lime, and Sulphate
of Barytes —

Spec II

Carbonat. of Lime and Mica

Spec III

Mixture of Calcareous & Magnesian
Stones —

Calcareous Stones and
Fragments of Quartz. —

Jasper & Feld Spar.

Commonly Called Porphyry.

Jasper & Garnet.

Jasper & Calcedony

Jasper & Quartz
Jasper Quartz, and
Feld Spar. —

Shale, Garnet, and
Tourmaline —

Concerning the Diamond
I found on the Coast of Coromondal
in the Kingdoms of Golconda and
Visapour —

Diamond. divid^d. into 2 Kinds
1 The oriental Diamond
2 The Brazilian —

The Empress of Russia gave 12 Tons
of Gold for a Diamond or 100,000
Florins —

The Diamond is combustible

General Views
 Respecting
 The Decomposition and Changes to
 which the Stony part of our Globe
 has been subjected—

We shall first examine the primitive
 Rock which forms the Nodule or Cen-
 =tral part of our Globe—

Q. Of What does the Central part of
 the Globe consist?

A. Granite This Substance is
 Considered as the Nucleus of the
 Globe— and upon this Substance all
 Matters of posterior Formation rest.

Concerning Antimony

When mineralized by Sulphur
it exhibits 3 or 4 varieties
it is sometimes Crystallized
of a grey Color inclining to
Blue

Plumose Antimony is usually of
a blackish Grey. This Variety
has been arranged among the
Ores of Silver. Because it for the
most part contains that Metal.

Ores of Antimony have been found
in several parts of France. But
the Province of Languedoc exhibits
very curious Specimens -

There are 2 Methods of depriving
Crude Antimony of its Sulphur

1 Slow and gradual Calci-
-nation of the Ore, it affords a
grey Oxide, and this mixed by

a Violent heat is Converted
into a Reddish and partly trans-
parent Glass of Antimony
it is violently Corrosive but
is Capable of being Corrected
by mixing or kneading it with
Yellow Wax and afterwards
Lining off the Wax. This is
the Cerated Wax of Pringle so
much extolled in Dysentery

2. Antimony may be deprived of its
Sulphur by projecting into an
ignited Crucible a Mixture of
8 parts of Crude Antimony - 6
of Tartar and 3 of ~~Antimony~~
Nitre - By keeping this Mixture
in fusion for a certain time Antimony
is obtained in the Metallic state
Copper, Silver & Iron wⁿ fused wth of
Sulphure of Antimony, seizes its Sulphur
and Reduces it to the state of Regulus.

If 2 parts of the Corros. Muriat:
of Mercury and one of Antimony
be distilled together, a very slight
Degree of heat drives over a Butyrea-
-ous Matter it is called
Butter of Antimony or sublimed
Muriat. of Antimony. it is used
an Eucharistic - in this Salt is diluted
in Water a ~~fine~~^{white} powder falls
down, called powder of Algaroth,
or Mercurius Vitæ.

Wine & the Acetum Acid Dissolve
Antimony;

Antimoniated Tartre of Potash
is decomposed on the fire. by cracking
and leaves a Coaly Residue - 60 parts
of Water dissolve it - it is likewise
decomposed by the Alkali & Lime -
Equal parts of Antimony and Nitre thrown
into a Crucible & ignited is reduced to the
State of white Acid: this is called diaphoretic
Antimony.

11
A Catechetical Compend of Mathematics.

What do you understand by Mathematics?

That doctrine which explains the nature & properties of
Quantities with respect to Number, magnitude of figure.
How may this Science be divided?

Into two parts. Arithm. & Geometry.

What is Arithmetic?

That part of Mathematics which explains the Nature
of properties of ~~magnitudes~~ Numbers.

What are Numbers usually employed to express?

Either Multitude abstractly considered or of several
Denominations of money, weight, & Measure.

How are Numbers most usually expressed?

By the ten Arabic Characters of figures, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

How are the Values of figures estimated with respect
to their place, in the Notation of Numbers?

That figure which occupies the right hand place signifies

so many Units, that in y^e second place so many tens
that in the third place so many hundreds, and so on
increasing in a ten fold proportion from right to left.

What are the fundamental Rules or Operations
in Arithmetic?

Addition, Subtraction, Multiplication & Division
So it may be added Involution, evolution & Pro-
=portion tho in some Measure founded on the
other four.

What are the chief Properties of four Numbers
directly proportional?

(1) The rectangle of the two Extremes will be equal
to the rectangle of the two Means.

(2) They will be alternately proportional that is,
~~2^d 1st 4th 3^d 1st 3^d 2^d 4th~~
~~2 : 1 :: 4 : 3~~ 1 : 3 :: 2 : 4

(3) They will be inversely proportional that is,
2^d 1st 4th 3^d
2 : 1 :: 4 : 3

(4) They will be compoundly proportional that is,
the Sum of 1st & 2^d 2^d :: Sum of 3^d & 4th 4th
1 + 2 : 2 :: 3 + 4 : 4

(5) They will be dividibly proportional
that is y^e Diff. of 1st & 2^d 2^d :: diff of 3^d & 4th 4th
2 - 1 : 2 :: 4 - 3 : 4

How is 4^{th} Term in direct proportion found?

By multiplying 1^{st} & 2^{d} together & dividing the product by the 3^{d} .

How in inverse proportion

By multiplying 1^{st} & 3^{d} together & dividing the product by the 2^{d} .

Explain each of these?

By addition we find the Amount or Sum of any given numbers collected together.

By Subtraction we find the Diff. of two unequal numbers.

By Multiplication we find the Amount of a given Number repeated any Number of times. The Number multiplied is called the Multiplicand, the Number multiplying the Multiplicand, or both are called factors, & the Number produced the product or rectangle of those factors.

By Division we find how often one Number is contained in another. The Number divided is called the Dividend. That divided by, the Divisor.

and the Number produced by the Operation
the quotient.

By involution we find the product of any
Number of equal factors Multiplied continually
together. This product is called a power of
the Number from which it was produced the root
of that power

By Evolution we find a root of any given power
or by the rule of three or proportion we find a
4th proportional to three given Numbers

How are the diff^t powers of roots particularly
denominated?

The product of two equal factors is called the
Square or second power, the product of three
equal factors, the Cube or third power, that
of four equal factors, the biquadrate or fourth
power &c and the roots of these powers are
called the square root, the cube root, the
biquadrate root, &c.

Give an Example of each of these fundamental
Operations in Numbers.

The sum of 12 and 3 is 15, by Addition

The Diff. of 12 and 9 is 3 by Subtraction

(5)
The product or rectangle of 12 and 3 is 36 by Multⁿ
the Quotient of 12 by 3 is 4. by division

The Square of 3 is 9 & the Cube of 27 by Involution.
3 is the Square root of 9, & the cube root of 27 by
evolution.

And 4 is a 4th proportional to 12, 3, & 16.

What do you understand by ratio as applied
to Numbers?

It is the relation of one Number to another, & may
be expressed or measured by the Quotient of the 1st
called the Antecedent divided by the 2^d called the
consequent.

When are four Numbers said to be directly propor-
= tional?

When the 1st has the same ratio to the 2^d that
the 3^d has to the 4th.

Give an Example

$$12:3::16:4$$

When are two Numbers said to be inversely as
two other Numbers?

When in one pair the Antecedent has the same ratio

6
to its consequent. That in the other pair the consequent
has to its Antecedent.

Give an Example
inversely

12 is to 3 as 4 to 16

When are two Numbers said to be reciprocally
proportional to two other Numbers?

When one of the Numbers in the 1st pair is to
one of the Numbers in the 2^d pair as the remaining
Number in the 2^d pair to the remaining Number
in the 1st pair. Give an Exam.

12 & 4 are reciprocally proportional to
3 and 16. For $12:3::16:4$

What are the chief properties of four Numbers
directly proportional?

- (1) The rectangle of the two Extremes will be equal
to the rectangle of the two means.
- (2) They will be alternately proportional that
is $1^{\text{st}}:3^{\text{d}}::2^{\text{d}}:4^{\text{th}}$
- (3) They will be inversely proportional
that is $2^{\text{d}}:1^{\text{st}}::4^{\text{th}}:3^{\text{d}}$

4
4) They will be compoundedly proportional
That is $2^{\text{d}} : 1^{\text{st}} :: 4^{\text{th}} : 3^{\text{d}}$ the sum of $1^{\text{st}} \& 2^{\text{d}} : 2 ::$
the sum of $3^{\text{d}} \& 4^{\text{th}} : 4$

5) They will be dividedly proportional
That is the Diff. of $1^{\text{st}} \& 2^{\text{d}} : 2^{\text{d}} ::$ diff. of $3^{\text{d}} \& 4^{\text{th}} : 4^{\text{th}}$

Now is of 4^{th} Term in direct proportion found?
By multiplying the $2^{\text{d}} \& 3^{\text{d}}$ together & dividing
the product by the 1^{st} .

Now is in inverse proportion

By multiplying the $1^{\text{st}} \& 2^{\text{d}}$ together & dividing
the product by the 3.

What do you understand by a Progression?

A rank or Series of Numbers gradually
increasing or decreasing according to some certain
Law.

What is an Arithmetical Progression?

That in it the Terms gradually increase or
decrease by a common Diff. as. 1, 2, 3, 4, 5, 6, &c

Mention the chief properties of an Arith. Series?

(1) The sum of n 2 Extremes equals the sum
of any two terms equally distant from n 2
Extremes.

(8)
(2) When three terms are in Arithmetical Progression
the sum of the two Extremes equals double the
Mean.

How would you find the greatest term from
the least, common Diff. & Number of terms?

I would multiply the com. Diff. by the Number
of terms less one & to the product add the 1st term.
The sum would equal the greatest.

How would you find the sum of the whole
Series.

Multiply the sum of the two Extremes
by $\frac{1}{2}$ the Number of terms - The Product would
be the sum of the Series.

What is a geometrical Series?

That in it the terms gradually increase or decrease
by a common Multiplier or divisor

as 1, 2, 4, 8, 16, 32 &c. or 32, 16, 8, 4, 2, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ &c.

Mention the chief properties of a geometrical Series?

1) The rectangle of the two Extremes equals the
rectangle of any two terms equally distant
from the Extremes

2) When three terms are in geometrical Progression
the rectangle of the two Extremes equal the square
of the Mean.

(9)

3) In a finite series of the common ratio be said to a power equal the number of terms - 1 this power multiplied by the last term will give the greatest.

The Diff. between the greatest & least Terms divided by the ratio less one will give the sum of all the Terms except the greatest.

What is a Fraction

Some part or parts of an Unit or Integer?

What is meant by the Denom. of Numerator of a frac.

The Denom. of a frac. is the number of parts into which the Integer is conceived to be divided. of the Numerator is the Number of those parts in the Frac. — Or a Frac. may be considered as the Quotient arising from Division of the Numerator by the Denom.

How many kinds of fract^s are there?

Two; Vulgar & Decimal — What is the Diff.

In Vulgar Fract^s the Denom. may be any Number whatsoever & is always set under the Numerator & a line drawn between them

But in decimals the Denom. is either 10 or

Or some Power of 10 as 100, 1000 &c. You need not
be express'd but is understood to be an Unit
& as many Cyphers annexed as there are places
in the Numerator —

How then is a decimal distinguished from
a whole Number? By a Dot before it —

How many kinds of Vulgar Fraction then?

Three; proper, improper & compound

Explain & exemplify each of these?

In a proper Frac. the Numerator is less than
the Denom. as $\frac{2}{3}$

In an Improper Frac. the Numerator is not
less than the Denom. as $\frac{4}{2}$, $\frac{4}{3}$ —

A Compound Frac. is a frac. of a frac. as $\frac{3}{4}$ of $\frac{5}{6}$

What is a mixed Number?

A Whole Number & a frac. as $11 \frac{3}{4}$

Mention some general principles upon which the
Operation in fractions may be explained —

1) If both parts of a frac. be employed or divided
by the same Number the result will be
a frac. of the same ~~value~~ ^{Value}. tho' in diff. terms
thus $\frac{2}{4}$ $\frac{4}{8}$ & $\frac{1}{2}$ are all equal to each other.

2) A Frac. is multiplied either by multiplying
the Numerator or dividing the Denom. by the
Multiplier

31 A frac. is divided¹¹ either by dividing the Numerator
or Multiplying the Denom. by its Divisor.

What is meant by a com. Measure of 2 or more
Numbers?

Any Number that will divide them severally
without a Remainder.

When are Numbers said to be primes to each other?

When they have no common Measure

How would you find the greatest com. Measure
of any 2 given Numbers?

By dividing the greater by the less & always
that Divisor by the remainder following
untill nothing remains: The last Divisor will
be the greatest com. Measure reqd.

What do you understand by a com. Multiple
of 2 or more given Numbers?

Any Number w^h they will all severally
divide without a Remainder

How would you find the least com. Multiple
of 2 or More given Numbers?

I would first place them in a straight line
one after another, then divide any 2 or more
of them by any com. Measure getting under each
the several Quotients together to find of the

Numbers as were not divided: Then proceed to this 2^d rank of Numbers as to the first of so on till no farther Division can be made - The last rank of Numbers of the several Divisors multiplied continually together would give the least com. Multiple req^d.

How would you reduce a frac. to its lowest Terms.

By dividing both parts of the frac. by the greatest com. measure of the result by the same or any other com. measure, if so on till no farther Division can be made - the frac. is then in its lowest Terms.

How would you reduce fracts to a common denominator

I would multiply severally each Numerator into all the Denominators but its own for new Numerators of all the Denom^t for a new Denom.

Or first find the least com. multiple of all the Denominators for a com. Denom. Divide this by the given denominators severally

I multiply the Quotient by the given Numerators respectively for new Numerators -

What is the Diff. between these two Rules for reducing fracts to a com. Denom.

The last always gives the frac. in its lowest Term possible the other does not, unless the Denominators of the given fracs are primes to each other.

How would you reduce a compound frac. to a simple one?

Multiply all the Numerators together for a new Numerator of all the Denominators for a new Denom.

How would reduce a mixed Number to an improper Frac.

Multiply the integral part by the Denom. of the ~~Numerator~~ frac. adding in the Numerator for a new Numerator & subscribe the Denom. of the fractional part for a Denom.

How would you reduce an improper Frac. to a mixed Number?

Divide the Numerator by the Denom. the Quotient will be the integral part, of the Remainder & Divisor will be the Numerator & Denom. of the fractional part.

How would you reduce a frac. of a higher Denomination to a lower, as the frac. to 4 of a Shilling?

Multiply the Numerator by that Number is

14
one of the higher contains of the lower

How from a lower Denom. to a greater as y^e
frac. of a Shilling to that of a pound?

Multiply the ^{Denom.} Numerator by that Number
is of the greater Denom. contains of the less.

How woud you reduce any given Quant^y of
Money weight or measure to a Frac?

Reduce the given Quant^y to its lowest
denomination for a numerator of the given
Integer to the same denomination for a Denom.

How woud you find the Value of a frac. in
known parts of the Integer?

Give the rule for the Addition of frac^s?

First reduce them to com. Denom. then add the
Numerators together for a new Numerator
to y^e com. Denom.

— For Multiplication — Multiply the
Numerators of the given frac^s together for
a numerator, & the Denom^s for a Denom.

— For Subtrac. First reduce the given frac^s
to a com. Denom. then subtract the Numerator
of the lesser Frac. from y^e of the greater for a
numerator to the com. Denom.

For Division — Multiply the Denom. of the Divisor by the Numerator of the Dividend for a numerator and the ^{Numerator} Denom. of the Divisor by the Denom. of the Dividend for a Denom. —

For Involution — raise both parts of the fract. to the given power —

For Evolution — Extract the root of both parts of the fractions.

Give an Exam. of each of the foregoing rules in Numbers.

- 1) What is the Sum of $\frac{2}{3}$ & $\frac{3}{4}$ is $\frac{17}{12}$ or $1\frac{5}{12}$ by Addition
- 2) The Diff. of $\frac{2}{3}$ & $\frac{3}{4}$ is $\frac{1}{12}$ by Subtrac.
- 3) The Prod. of $\frac{2}{3}$ & $\frac{3}{4}$ is $\frac{6}{12}$ or $\frac{1}{2}$ by Multip.
- 4) The Quotient of $\frac{2}{3}$ & $\frac{3}{4}$ is $\frac{8}{9}$ by Division
- 5) The square of $\frac{3}{4}$ is $\frac{9}{16}$ by Involution
- 6) The square root of $\frac{1}{4}$ is $\frac{1}{2}$ by Evolution

Of Decimals

How are the com. Arithmetical Operations performed in Decimals?

Exactly as in whole numbers with a few necessary Cautions. Mention these necessary Cautions

- 1) In Addition & Subtraction — That the decimal points that separate the whole Numbers from the fractions, both in the given Numbers &

in the Sum or Diff. stand under one another
in the same perpendicular Row -

2) In Multips. - First that there be as many
decimal places pointed off in the Product
as in both the factors.

3) In Division - That there be as many
decimal places pointed off in the Quotient
as in those in the Divisor may be equal to
those in the Dividend.

4) In ~~Evolution~~ Evolution - There will be as many decimal
places in the power as those in the root multi-
plied by the Index of the Power

5) In Evolution - That the period, be reckoned
from the decimal point in the given power.

If in any Operations there should not be as many
figures in the result as there ought to be decimal
places, how would you supply the Defect?

By prefixing a sufficient Number of Cyphers.
What is the effect of removing the decimal point
toward the right or left?

Removing it one place towards the right Multi-
plies by 10, two places by 100: - one place towards the
left divides by 10, 2 by 100, & so on ~

How would you reduce a Vulg. frac. to a decimal?
Annex Cyphers as decimal places to the Numerator
and divide by the Denom.

How would you reduce any given Quant.^y of
Money, weight, or measure, to a decimal of any
higher Denom.?

First reduce the given Quant.^y to a vulgar
frac. & then that vulg. frac. to a decimal.

How would find the Value of a decimal in
known parts of the Integer?

Multiply the decimal by the Number is one
of the given Integer contains of the next lower
denomination, the decimal part of the Product
by that Number is one of this Denomination
contains of the next lower, & so on, then the
Integral parts of the sundry products collected
together will be the Value req^d.

Have you any short Method of reducing
Shillings pence & farthings, to the decimal
of a pound?

yes; to the Shillings annex the $\frac{1}{2}$ farthings
in the pence & farthings, increased by two

half farthings if they exceed $3\frac{1}{2}$ if by 11 when they exceed 9 - then half this sum will be the decimal req^d true to three places.

How would you reverse this operation that is, find the value of a decimal of a pound expressed by 3 figures?

Double the given decimal calling the two figures on the right hand of the product last farthings of the rest of shillings: the half farthings to be diminished by 2 if they exceed $3\frac{1}{2}$ if by 11 if they exceed 9 $\frac{1}{2}$ —

Of Logarithms

What do you understand by Logarithms?

They are artificial Numbers so adapted to the natural Numbers, that the sum of the Logarithms of any two Numbers may be the Logarithm of the product of these Numbers.

How then would you perform the different Operations in Arithmetic by Logarithms?
Multiplication of Numbers by the Addition

of their Logarithms - Division by the Subtraction
 of their Logarithms - Involution by a Multiple
 of Evolution by Division.

Upon what principles may the Logarithms
 of Numbers be computed?

If there be a rank of Numbers in arithmetical
 Progression, beginning at 0, & a rank in Geo-
 metrical Progression beginning at 1 what
 ever be the com. Diff. & common ratio the terms
 of the Arithmetical Progression will be γ^e
 Logarithms of their corresponding terms in
 the geometrical progression.

From what particular Series were the Table
 of common Logarithms computed?

The Arithmetical Series is 0, 1, 2, 3, 4, 5, 6, &c
 the com. Diff. being 1, & the Geometrical Series
 is, 1, 10, 100, 1000 &c the com. ratio being 10, & is the
 Logarithm of 1 of 10, 2 of 100 &c

How would you find the Logarithms of the inter-
 mediate Numbers between the terms of the
 geometrical Series? For instance the Logarithm
 of the Number 2.

This might be done by finding such a Number
 of geometrical Means between 1 & 10 that one

If there should be the given Number 2 with as many
 zeros immediately after the decimal point as
 the decimal places to which the Logarithms are to be
 calculated, & then finding a like Number of
 Arithmetical Means between 0 & 1 the Arithmetical
 Mean corresponding to the Number 2 in the Geom-
 etrical Means will be its Logarithm.

Would it be necessary in constructing a Table
 of Logarithms, to calculate in this manner
 the Logarithms of every Number in the Table?

No. Only of the prime Numbers for the rest
 might be found from these, by Addition or Subtraction.

What is meant by the Index of a Logarithm?
 It is the whole Number or Integral part, & is
 always an Unit less than the Integral places
 in the corresponding number.

What then will the Index of the Logarithm
 of a fraction be?

It will be a negative Number consisting
 of as many units as the place of the first
 significant figure of the frac. is from the decimal
 point. — How would you find the Logarithm
 of a Number exceeding the limits of the Table
 made use of?

By adding to the Logarithm of the Number n less, found in the Table, a proper proportional part of the Diff. between it & the next greater. How the Number corresponding to a Logarithm not exactly found in the Table?

By adding to the Number corresponding to the Logarithm next less found in the Table, a proportional part of the Diff. between it & the next greater. — Is the Diff. of Numbers strictly proportional to the Diff. of their Logarithms? Not strictly but very nearly so. Is the Diff. of the Logarithms is small compared to the whole Logarithms.

In extracting the root of a fac. by Logarithms is the negative Index of the Logarithms is not exactly divisible by the Index of the Power how would you proceed?

I would increase the negative Index by such Number as would make it divisible & then suppose the same Number prefixed to the decimal part of the Logarithm.

Enumerate some of the Uses of Arithmetic in the common Affairs of Life?

Arithmetic is employed in finding the Amount of any given Number of particulars at a given rate.

in all other Questions relating to buying & selling
or Barter — In Questions relating to the Interest
of Money — Annuities, Discount, insurance,
exchange — Allegation — & in all other numeri-
cal Calculations, in the other Branches of
Mathematics, or natural Philosophy.

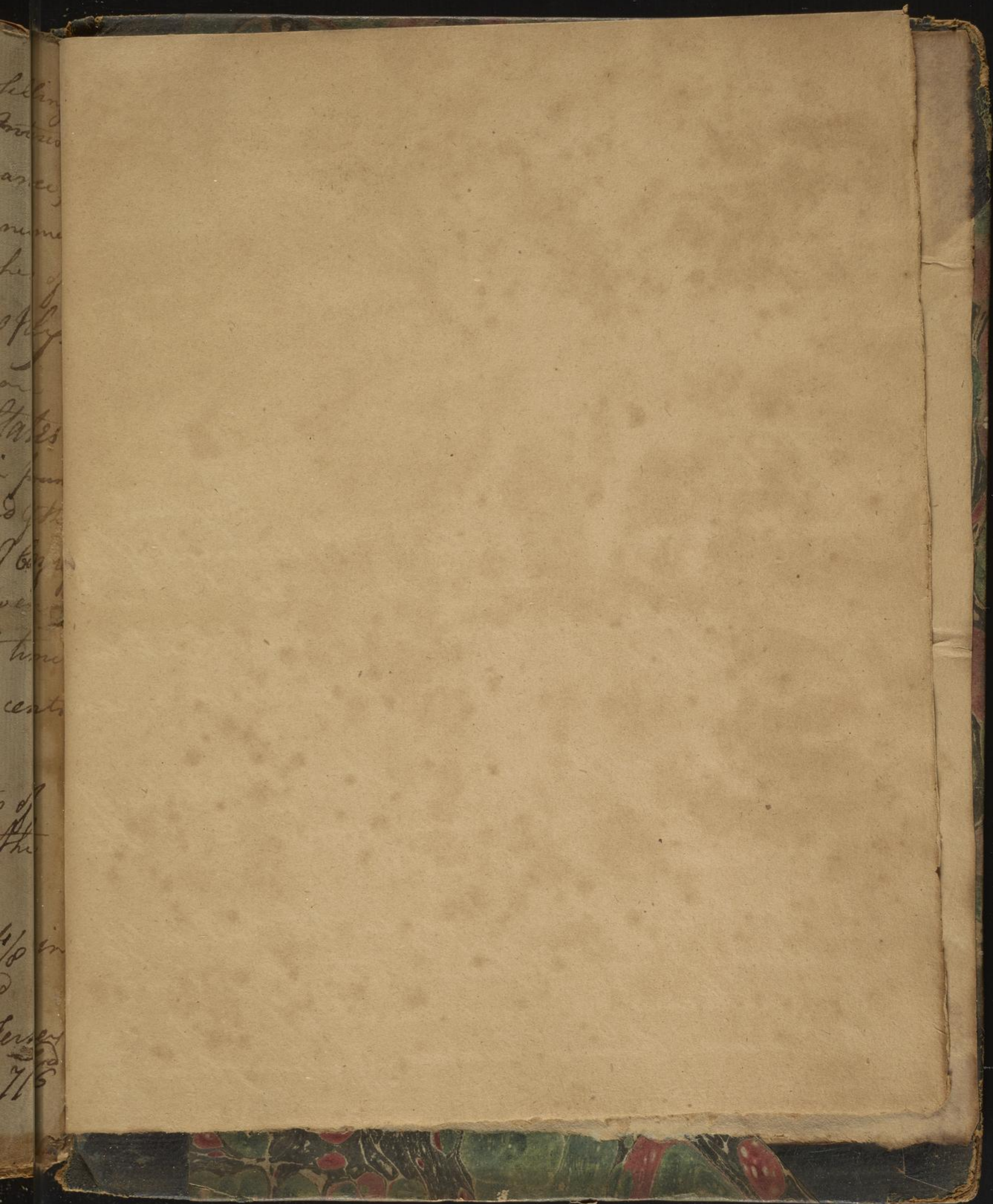
~~Q~~ In what denominations of Money are
accounts usually kept in the United States
In the particular States they are kept in pounds
Shillings, pence, & farthings, as in England & the
Countries subordinate. The Account of Congress
before the late federal Constitution were
kept in Doll^s and 90^{ths} — but since that time
they are kept in Eagles, Doll^s dimes, cents
& mills.

Q Is the Money of Account in the diff^t States of
the same intrinsic Value compared to the
Dollar as a com. standard?

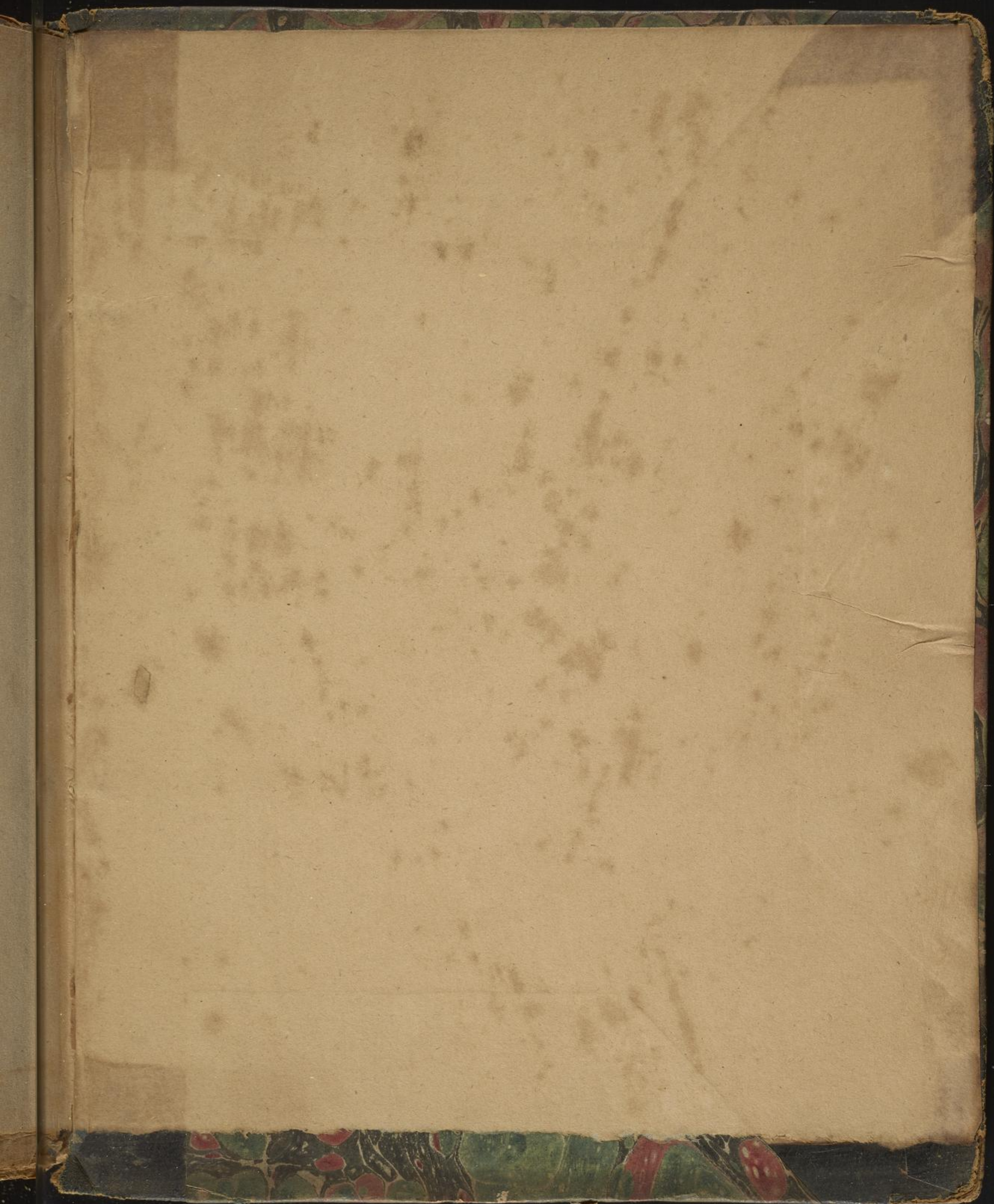
No. In S. Carolina & Georgia the Doll. is $\frac{4}{5}$ in
N. Hampshire Massachusetts, R. Island
Connecticut & Virginia it is $\frac{6}{7}$ In N. Jersey
Delaware, Pennsylvania, & Maryland $\frac{7}{8}$

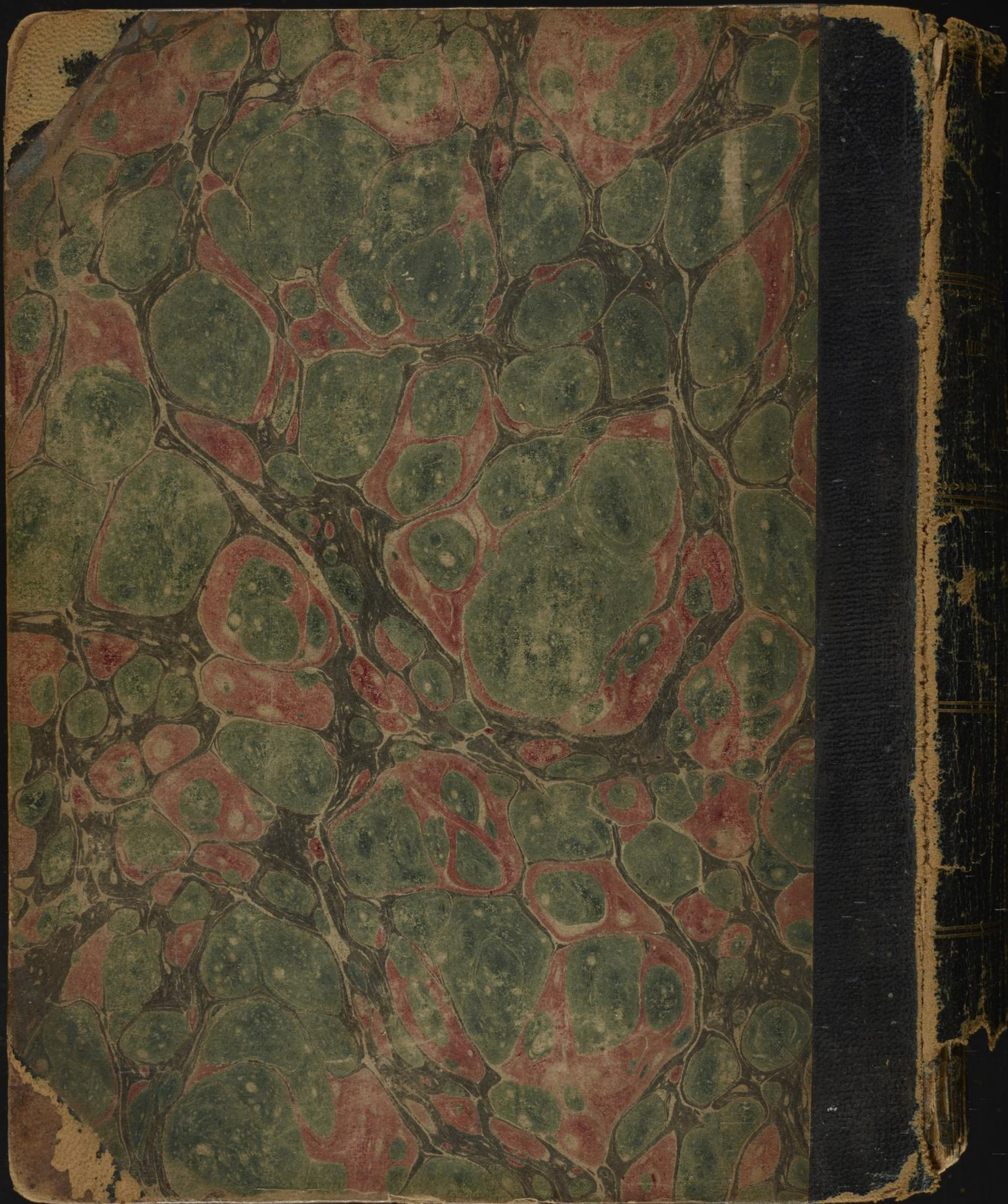
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